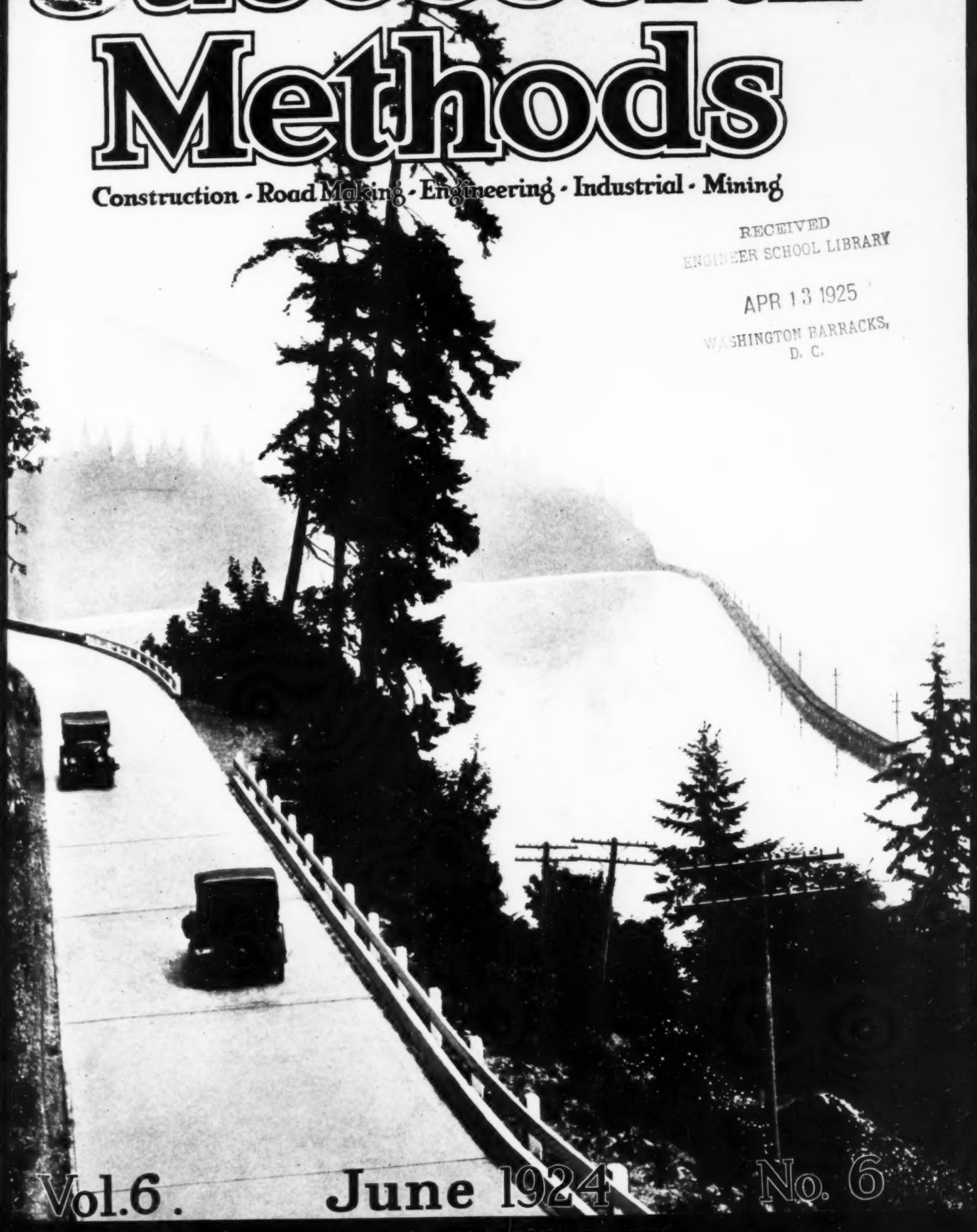
Successful Methods

Construction - Road Making - Engineering - Industrial - Mining



Vol.6. June 1924 No. 6

"rather have a LE ROI than an electric motor"

There is no better recommendation for an engine than the unbiased testimonial of a user.

Hammen & Company
CONTRACTORS
516 GARFIELD BUILDING

Nov. 3 1923.

Contractors' Equipment Company.
Detroit,
Michigan.

Gentlemen,-

Regarding our Le Roi engines, wish to state that in their class we are satisfied they are the best and most reliable engines we have ever used. One of our best foreman who has used one on a Sixty-foot, thirty-inch belt conveyor, continously all season claims he would rather have a Le Roi than an electric motor.

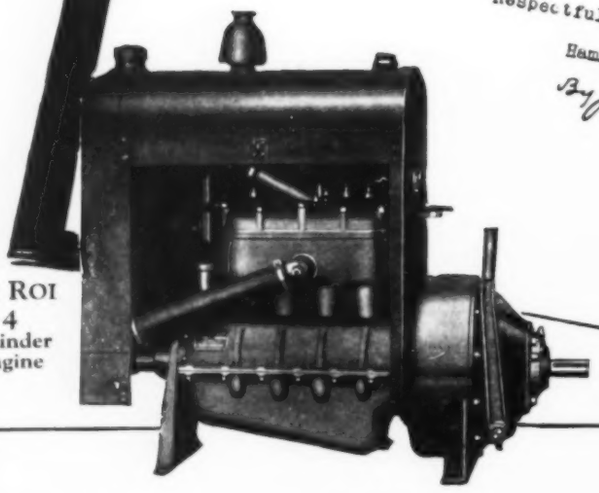
Respectfully,

Hammen & Co.

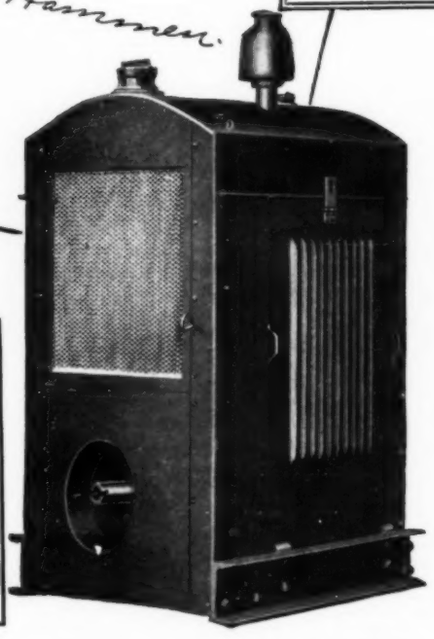
By J. J. Hammen.

NOTE

It is generally conceded that most mixers are underpowered. Every 4S mixer requires a LE ROI 4 H. P. Engine and every 7S mixer requires a LE ROI 8 H. P. Engine for a maximum of results at the lowest cost. If you are not using these engines ask us to prove why it will be to your decided advantage to do so. Use your letterhead, please.



LE ROI 4 Cylinder Engine



LE ROI Two Cylinder Engine

LE ROI Power Service

HOPPER COOLED TYPE — 3 to 4 H. P. Single Cylinder — 5 to 8 H. P. Two Cylinder.

RADIATOR COOLED TYPE — 5 to 8 H. P. Two Cylinder — 10 to 15 H. P. Four Cylinder.

LE ROI COMPANY, *Milwaukee, U. S. A.*

LE ROI ENGINES

for dependable power!

Successful Methods

A Magazine of Construction Service

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A Dearth of Good Foremen

GONE are the good foremen of yesteryear. Time was when the sons of Erin ruled the construction job with an iron, but sympathetic hand. Here and there a sturdy native son was walking boss, but the sergeants of the old days when men did a day's work for a day's pay were largely from the Emerald Isle.

And what foremen they were. They knew how to keep a gang going to the safe limit. Each was a genius at meeting emergencies. Each was a wizard when it came to getting the job done right—the first time.

But, as the cartoonist says, "Them days have gone forever." Formerly the foremen came right up through the ranks. They knew the job and they knew the laborer. Most of all, they had the gray matter.

Nowadays labor either lacks the desire or the ability and generally both to get ahead. Shorter hours, higher wages and a minimum of effort are the common attitude.

As a result machines are used to take the place of men wherever possible. Good machine runners can be had or trained. They come high, but it is cheaper and better all around to deal with a few of them than to try to get results out of big gangs of workmen handled by foremen who do not deserve the title. This is just one more outstanding reason why labor-saving machines are working in on jobs that it was formerly considered practical to do only by hand.

In a Spirit of Neighborliness

THIRTY-NINE engineers, educators and business men, making up the Pan-American Highway Commission, have come to the United States as representatives of the twenty Latin-American republics to study all angles of our highway affairs. The members of the Commission are primarily the guests of the High way Education Board. That organization is, however, being assisted very actively in the entertainment of our distinguished visitors by various departments of the United States Government, the Pan-American Union, eight States and several cities.

The Commission already has started on an extensive tour which will be one of the greatest experiments in international neighborliness ever undertaken. Beginning with a visit to President Coolidge at Washington on June 2 the party will spend four weeks in North Carolina, Kentucky, Ohio, Illinois, Minnesota, Wisconsin, Michigan, Pennsylvania and New Jersey.

A number of States not included in the tour and various cities have asked that they also be given a chance to entertain the Commission. The three weeks originally planned for the trip were extended to four to take in some of the more urgent late invitations that did not involve long rail trips. It is unfortunate that our guests could not visit all those communities which desired to be their hosts.

The distinguished visitors are interested most seriously, of course, in the methods and results of our vast highway program. We shall also have a wonderful opportunity to demonstrate to them that the people of the United States keenly appreciate their visit. Nothing will be left undone to make them feel that this is home while they are here, or whenever they may return.

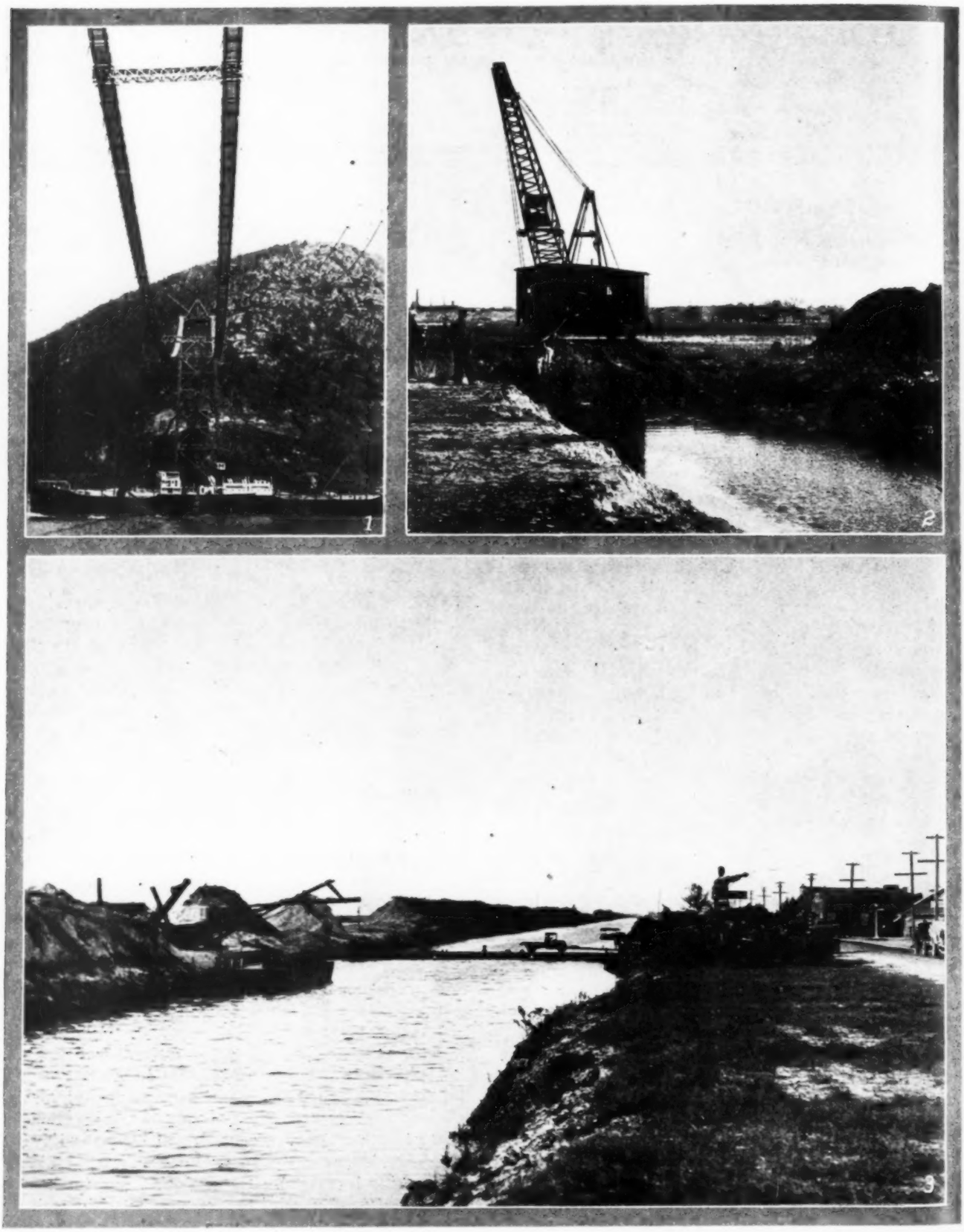
Prices

THE country is in the midst of what appears to be the beginning of a minor business depression. Business was going along in good shape up the time that the spineless Congressmen and Senators started to play politics and consider their political futures ahead of the welfare of the country. The ridiculous spectacle at Washington, with which we are all familiar, is apparently the sole reason why business men of the country have temporarily lost confidence in the immediate future.

Just how far the downward swing will go remains to be seen. If the politicians of the country would show some evidence of a return to their senses, other conditions are so fundamentally sound that an immediate improvement would certainly occur. Meanwhile the guess of one man is as good as that of another as to what is going to happen to business and to prices.

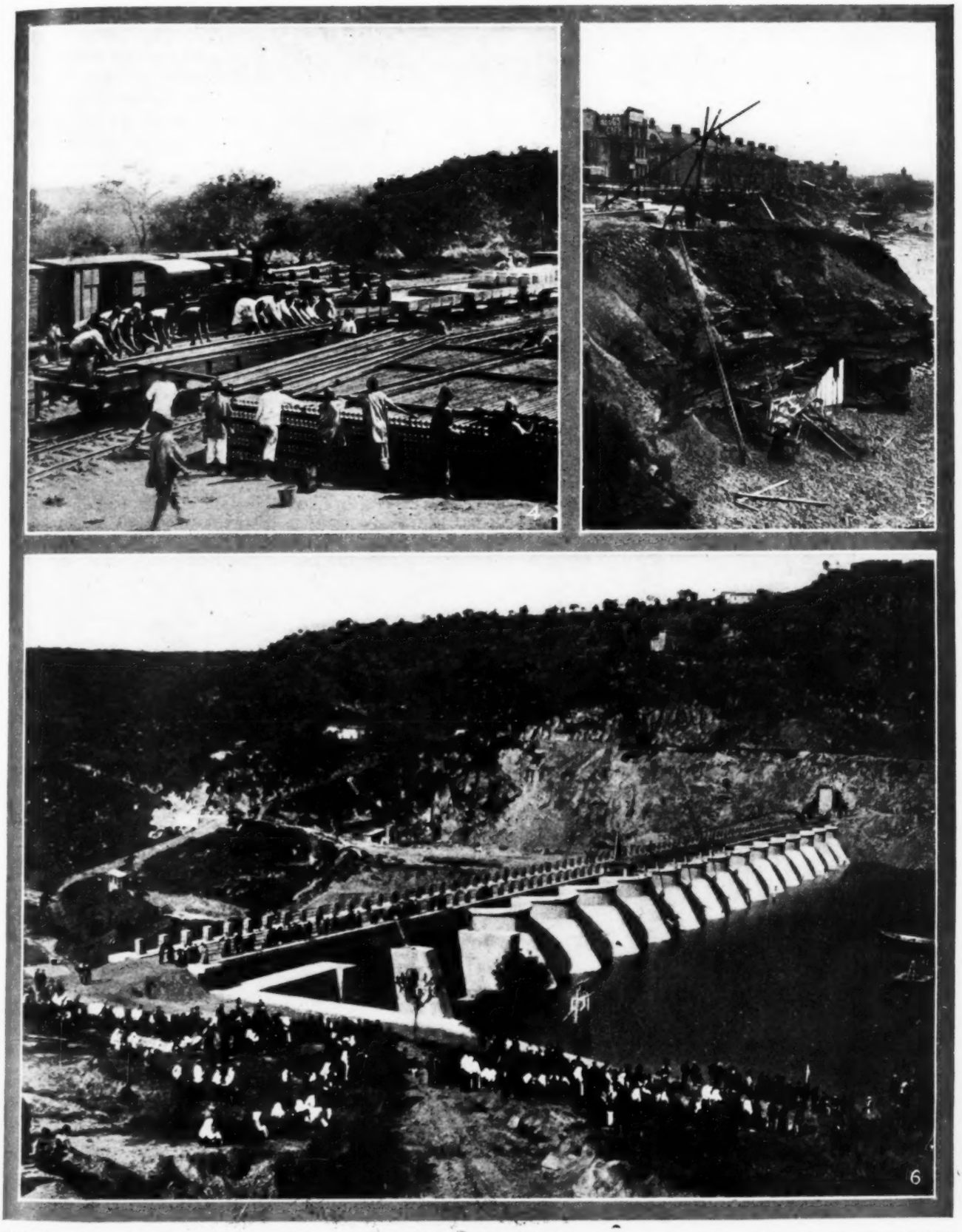
With the tremendous amount of idle money in this country, with small stocks in practically all lines, and with many other equally favorable features, it appears unlikely that any serious slump will occur. In fact, the behavior of prices in the steel industry recently indicates that prices there have been "dragging on the bottom." There may be some further recession in prices in other lines. No important downward swing can occur, however, until wages are reduced and labor efficiency is increased. The outlook is not in that direction. Consequently, contractors will do well in bidding on new jobs to figure that they will have to pay for materials, labor and equipment at about the present market.

A Little Variety



1. The Bear Mountain suspension bridge across the Hudson River now under construction. The steamer passing underneath gives a good idea of the height and length of the new bridge. © *United News Pictures.*
2. Diverting the course of the Arkansas River as a part of the Pueblo Conservancy Project. The dragline in the picture is the first of a number that soon will be at work. © *Keystone.*
3. Draining the Everglades. This photograph shows the part of the canal which is being dug from Lake Okeechobee to the sea. © *Keystone.*

In Construction



4. Railroad construction in French Africa. Labor is cheap and plentiful in that part of the world and men are used for jobs which are being done in the United States with machines. © *Keystone.*
5. Building a sea wall at Whitley Bay, Northumberland, England. This work is proceeding in rather leisurely fashion and the two men at the bottom of the ladder in the photograph are hoisting a bucket full of sand. © *Keystone.*
6. The great dam recently opened at Tirso on the Island of Sardinia. This photograph was taken on the day of the official opening when King Victor Emanuel was the central figure in the ceremonies. © *International.*

IMPROVING AN ISLAND CAPITAL

State of Santa Catharina, Brazil, Builds Big Suspension Bridge from Mainland to Its Seat of Government

THE State of Santa Catharina, Brazil, differs from almost every other political subdivision in the world by reason of the fact that its capital city is situated on an island in the Atlantic Ocean. This capital city is now known as Florianopolis, although on older maps it appears as Desterro. Up to the present the only way of reaching the island has been by boat. Even the water used in the capital had to be transported by boat as the island was not sufficiently large to make it possible to collect enough water to supply the city. This, of course, made the supply uncertain.

EXCAVATING FOR THE ANCHORAGE ON CONTINENT END OF BRIDGE

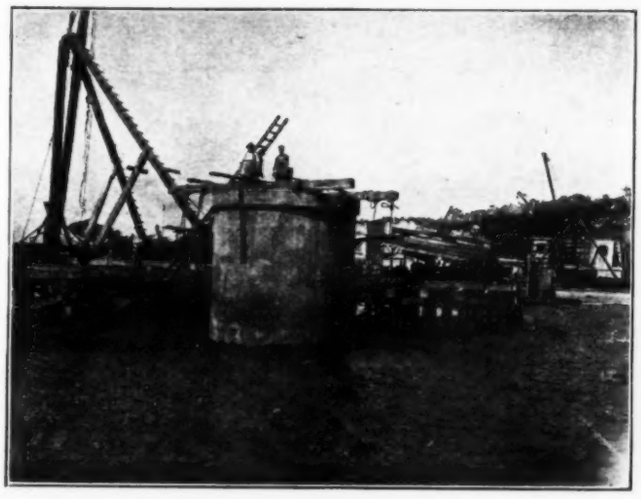
The State of Santa Catharina has taken steps to solve its unusual problem by building a suspension bridge from the mainland to the island. This bridge will provide room for a highway and an electric railway, and also will carry water mains. It will have a span of 1114 ft., making it the largest bridge in South America.

The bridge is of a new type of suspension construction invented by Robinson & Steinman, consulting engineers of New York, and will cost in the neighborhood of $2,000,000. The construction involves a new feature which will make the bridge

GENERAL VIEW OF THE SITE OF BRIDGE LOOKING FROM MAINLAND TOWARD CITY OF FLORIANOPOLIS ON ISLAND

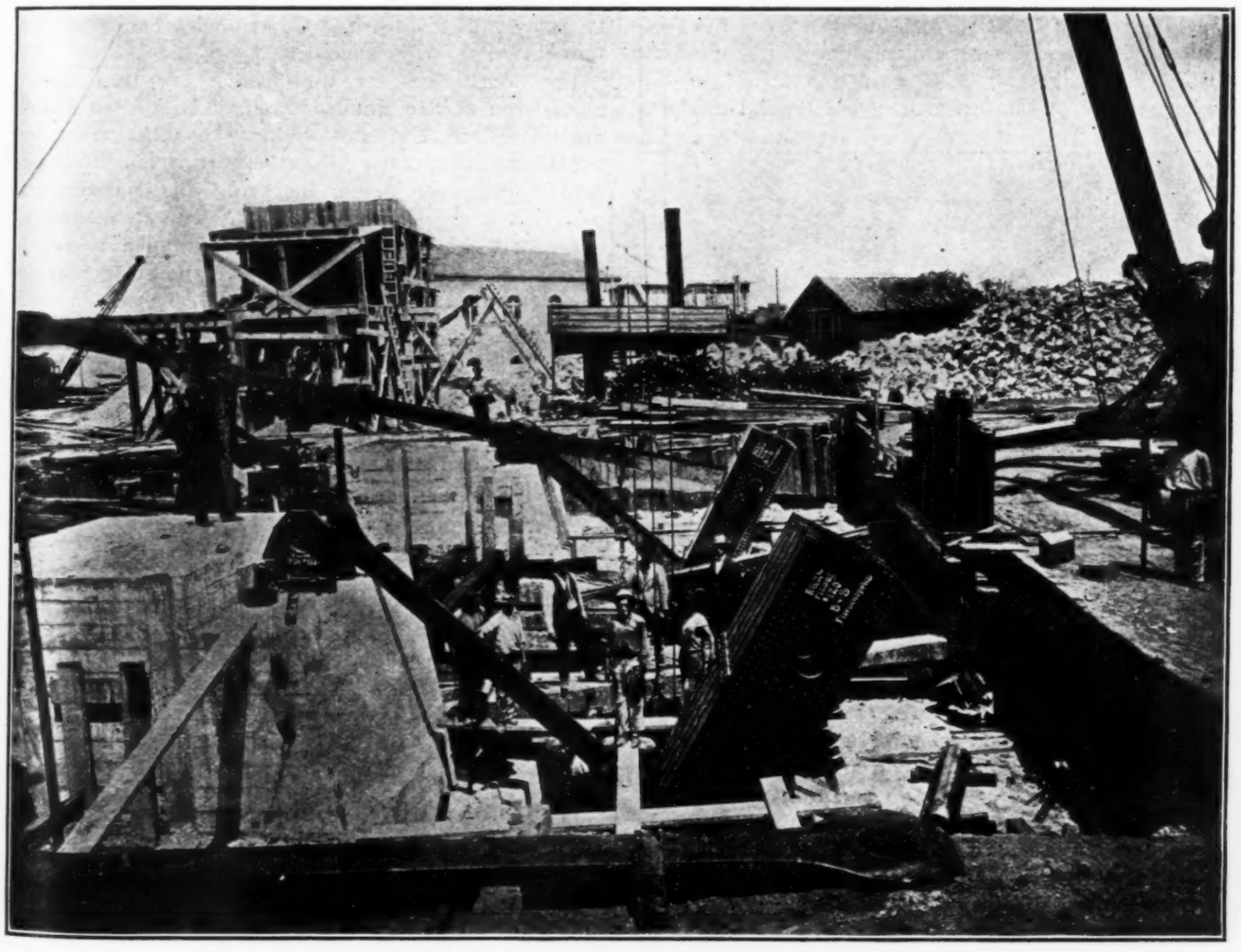
more rigid than the ordinary suspension bridge, although only two-thirds as much material will be used. This feature consists in utilizing the suspension chain as a portion of the top chord of the stiffening truss.

Unusual difficulties were encountered in sinking the foundations for the main piers. The original soundings were misleading on account of the large number of boulders occurring in the bed of the stream. In consequence, the piers had to be carried down to considerably greater depth than originally anticipated. The most interesting construction problems were encountered in sinking the foundations for the north continent pier. After the 38-ft. steel sheet piling was driven to its full depth, the foundation bed was still unsatisfactory. A test pit was sunk in the middle of the cofferdam to a depth 59 ft. below mean water level before solid rock was found. Diamond drill borings were sunk from the bottom of this test pit to an additional depth of 14 ft. to make sure that this foundation bed of rock was solid.

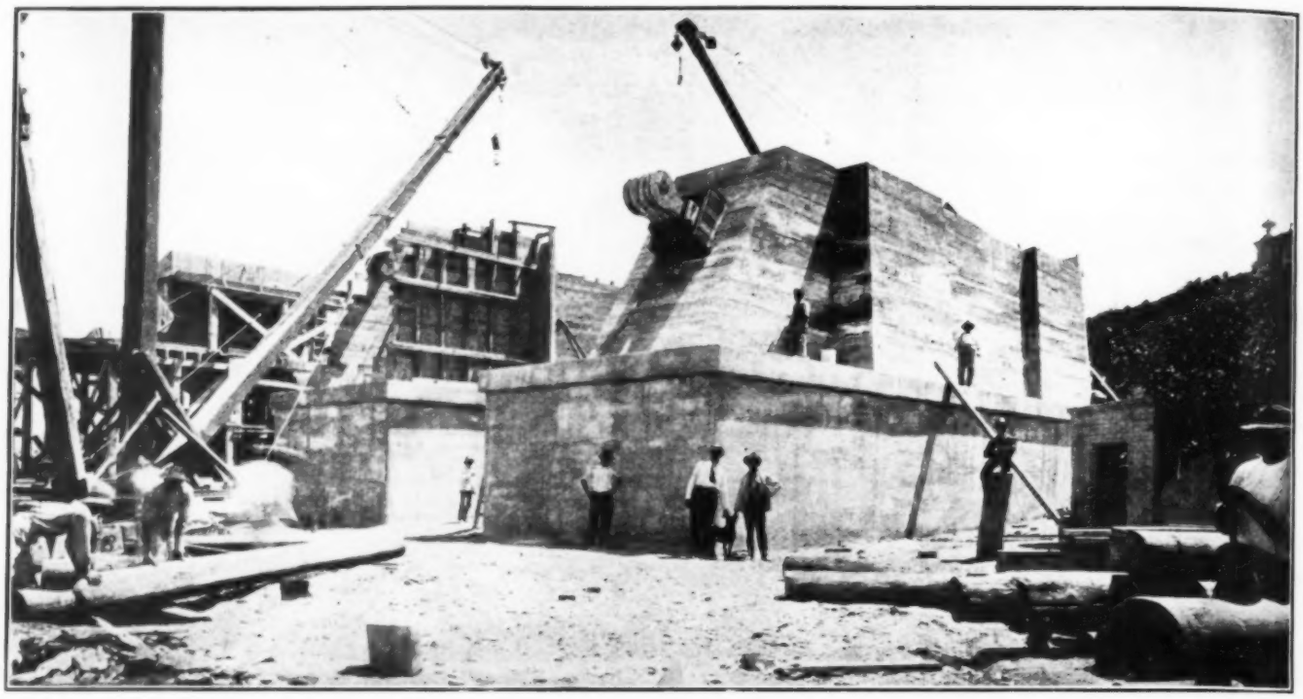


SHAFT OF ONE OF THE MAIN PIERS

The subsequent method of procedure was as follows: the central test pit 8 ft. by 8 ft., excavated with the aid of timber sheeting, was filled in with concrete. On either side of this central pit of concrete, additional pits were sunk inside the cofferdam to bedrock and then concreted. Separate test pits were then sunk at each corner of the cofferdam in turn, and filled with concrete. In this manner a solid foundation was obtained at 65.9 ft. with the aid of the steel sheet piling, which was only 38 ft. long. As a result this is probably the deepest foundation ever sunk with a steel sheet piling cofferdam. The outside dimensions of the cofferdam were 23 ft. by 23 ft. and the pier was built up inside of this with successive steps, terminating in a cylindrical shaft 20 ft. in diameter at the top.

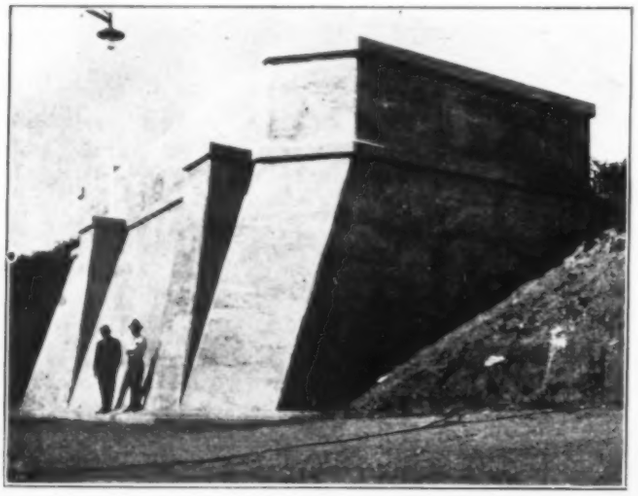


SETTING UP ANCHOR STEEL IN CONTINENT ANCHORAGE



ISLAND ANCHORAGE READY FOR STEEL WORK

The cofferdam for the south continent pier was made 28 ft. by 28 ft. In the greater portion of the area within this cofferdam rock was found at depths varying from 28 to 32 ft., but in one corner the rock sloped off in benches to a maximum depth of 60 ft. Ordinary construction was used for filling in the major portion of this cofferdam, but special methods had to be followed to take care of the deep corner. Additional sheeting was driven at this point and sacks of cement used to make it watertight in order to permit pumping out for excavation and concreting.

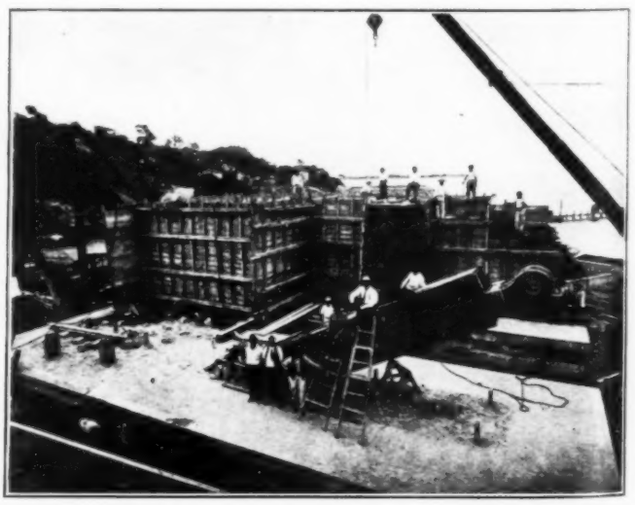


ABUTMENT AT END OF APPROACH SPAN

The south island pier had to be sunk to a depth of 50 ft. below mean water level, going through 35 ft. of water and 15 ft. of sand before rock was struck.

The anchorages constituted another important item of the masonry construction. On the island side, good rock foundations were easily obtained. On the continent side rock was not found at the depths anticipated and the design had to be changed so as to substitute a rigid and substantial pile foundation. Over 400 large piles had to be driven with their tops cut off 3 ft. below water level and capped with concrete as a foundation for this anchorage.

The contractors for this bridge are Byington & Sundstrom of São Paulo, Brazil. The United States Steel Products Corporation has the subcontract for furnishing and erecting the steel work. The substructure is now completed, including the foundations, piers, anchorages and abutments. The steel work is nearly all fabricated and will be shipped to South America shortly. It is expected that the bridge will be completed in the early part of 1925. The plans were prepared by Robinson & Steinman, 25 Church Street, New York. L. N. Gross is associated with them and G. A. Brinckerhoff represented them as resident superintendent.



EYEBARS FOR ANCHOR CHAINS PARTLY EMBEDDED IN CONCRETE

SMALL ROLLER TREADS LIGHTLY

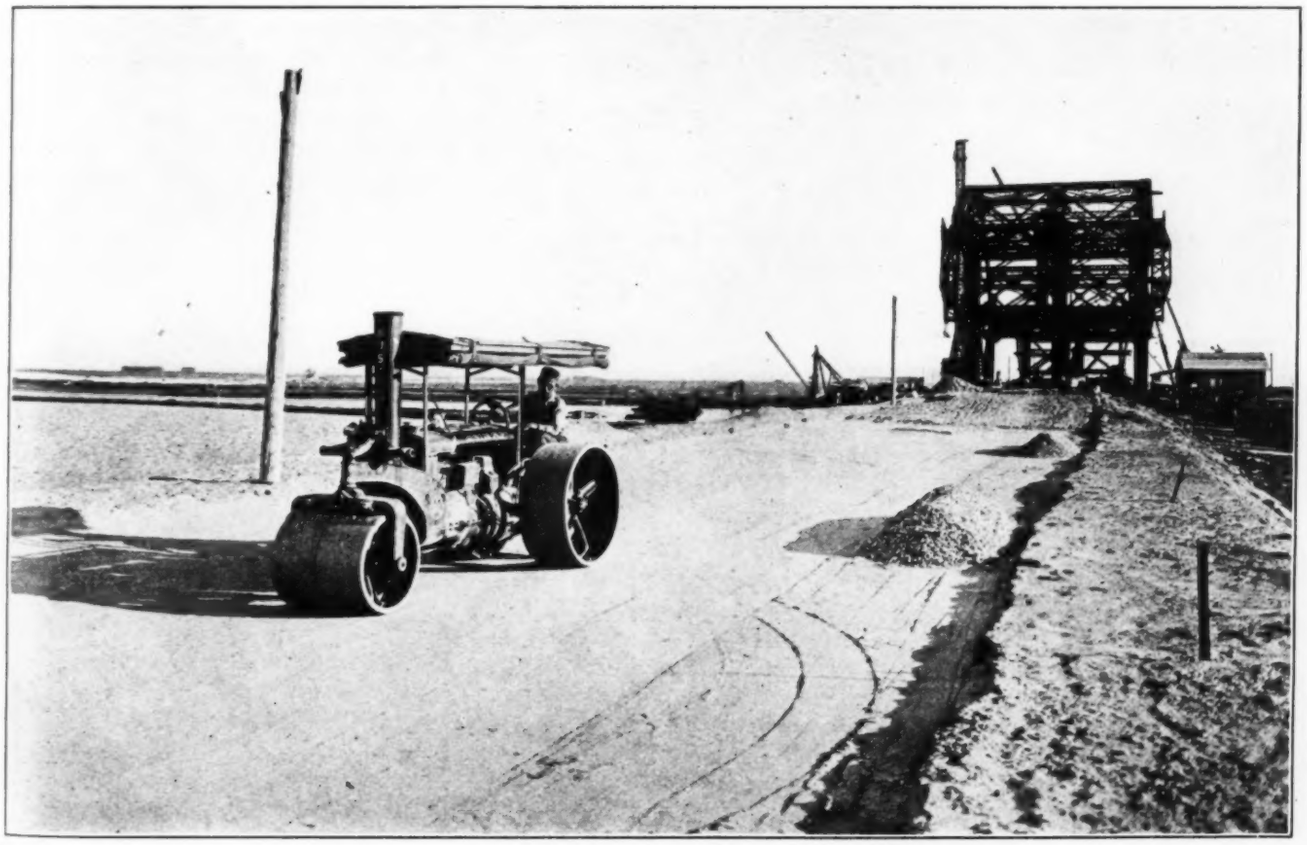
Compacts Subgrade on Sand Base Where Heavy Machine Could Not Be Used

MERE size is not always a desirable quality in construction machinery even on a job which itself is of considerable magnitude. A good illustration of this statement is furnished by the photographs on this page which show a small 3-ton roller in action on a sand base which at that stage of construction would not support the weight of an ordinary 8 or 10-ton roller.

ROLLING THE FIRST ROCK COURSE

The road shown in the photographs is being built by the Los Angeles Harbor Commission from Wilmington to Terminal Island. It is a macadam road supported by a sand base, the sand being pumped from the main channel of the harbor. This sand base was not firm enough to support heavy construction equipment until it had been rolled and compacted. It even was necessary to use teams instead of trucks to haul the rock when that stage of the work was reached. The large photograph at the bottom of the page shows the 3-ton roller just finishing a part of the subgrade.

THIS SHOWS THE SIZE OF THE JOB



PREPARING THE SUBGRADE

NORTH CAROLINA'S WAY OF HANDLING EMERGENCY DETOUR WORK

Portable Crane and Dump Trucks Surface Three Miles of Detour in Ten Days

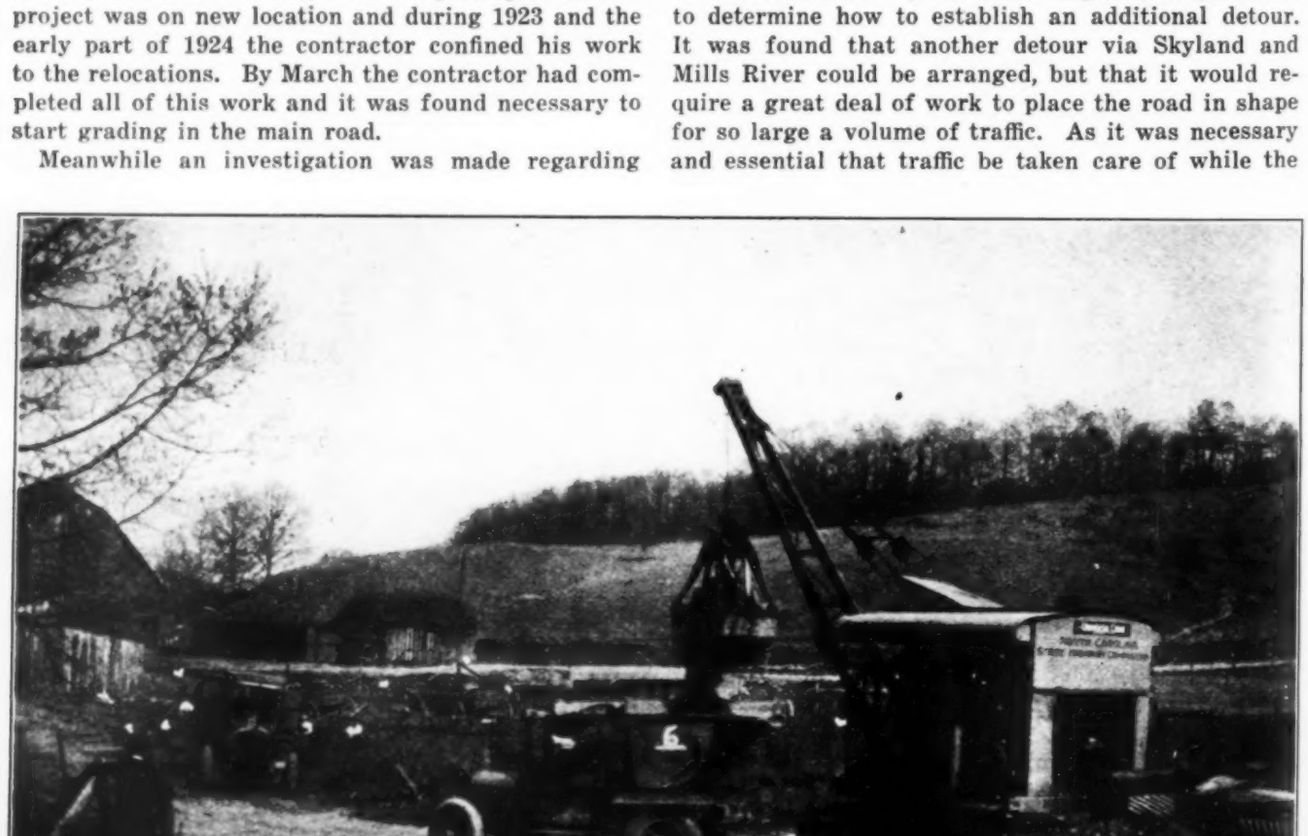
By W. E. Hawkins, Maintenance Engineer
North Carolina State Highway Commission

ONE of the cardinal principles of the North Carolina State Highway Commission is to leave nothing reasonable undone to keep detour roads in passable condition. There is a provision in the North Carolina Highway law which states that detour roads must be maintained while the main highways are under construction. The Commission has always tried to observe fully the spirit as well as the letter of this provision. Now and then an unexpected situation develops, however, which requires heroic action. Unseasonable weather, unexpectedly heavy traffic and similar factors, which cannot be gaged in advance, call then for emergency methods to avoid serious inconvenience.

A situation of this sort occurred recently on a project on the Hendersonville-Asheville Highway in the mountainous part of western North Carolina. The latter part of the summer of 1923 a grading project was awarded on this highway between Hendersonville and the Buncombe County line. A great part of this project was on new location and during 1923 and the early part of 1924 the contractor confined his work to the relocations. By March the contractor had completed all of this work and it was found necessary to start grading in the main road.

Meanwhile an investigation was made regarding detour roads. It was found that betterment work had to be done on these roads, including rebuilding of bridges and widening and reshaping the surface with a blade machine. The first part of April there was a change in weather conditions. For a period of a week or more there was cloudy weather and intermittent rains. The detour roads became in such shape that it was impossible to take care of traffic. The amount of traffic on this road at that time of the year varies from 1000 to 1200 vehicles per day. This consists of horse-drawn vehicles, passenger cars, buses and commercial trucks from 1 to 5-ton capacity. A considerable part of this traffic at that season also consists of tourists northbound from southern winter resorts.

The detour roads are of red brick clay that is hard to drain. As a result they became in such condition that the heavy traffic was unable to proceed. As is usually the case under such circumstances, the public soon recorded demands for relief. An investigation was at once made by the State Highway Department to determine how to establish an additional detour. It was found that another detour via Skyland and Mills River could be arranged, but that it would require a great deal of work to place the road in shape for so large a volume of traffic. As it was necessary and essential that traffic be taken care of while the



TRUCK-MOUNTED CRANE LOADING SURFACING MATERIALS FROM PILES TO TRUCKS.

main road was under construction, the decision was made to place the additional detour in shape immediately.

It was found that approximately three miles of the new detour road had to be resurfaced with gravel or topsoil. In order to do this work equipment had to be requisitioned at once. Request was made to superintendent of equipment of the State Highway Department to send six dump trucks and a full-circle-swing crane mounted on a motor truck so that the work could be started. The same day a telegram was received from Frank Page, Chairman of the Commission, that this crane and the trucks were leaving Raleigh and that traffic should be kept going under all circumstances. When a message like this is sent out it means that the instructions must be followed and no matter what the circumstances are traffic must get through.

DRAG SCRAPERS COLLECTING SURFACING MATERIALS INTO PILES.

Within three days the equipment arrived on the job and work of resurfacing the red clay sections of the new detour was started. The gravel and topsoil were found at various places adjacent to the road. At no one point was it practicable to obtain any considerable quantity of surfacing material. The deposits also were all shallow. Wherever borrow pits were opened the materials were scraped together in piles by means of teams and drag pans. The truck-mounted crane equipped with a clamshell bucket, loaded the materials from the piles directly into dump-body trucks in which they were then transported to the roads and spread to the proper thickness.

Within ten days the three miles of detour had been surfaced so that the road could be opened to traffic. During this time the truck-mounted crane and the fleet of dump-body trucks were operated from dawn until dusk, which accounted for the work being completed so quickly. The truck-mounted crane has proved to be a valuable unit on other emergency work. Whenever a hurried job is needed to place a detour road in shape, to resurface a section of topsoil road that has become rough and unequal to the ever-increasing volume of traffic, to unload such materials as coarse or fine aggregate and stone chips for surface treatment work this truck-mounted crane has worked out very effectively. It has proved a thoroughly useful unit of the State's highway maintenance equipment.

DUMP TRUCKS SPREADING SURFACING MATERIALS.

BIG OIL COMPANY REMOVES UNSIGHTLY SIGNS

THE action of the Standard Oil Company of California in removing its billboards from the scenic highways of that State has brought to the company a flood of expressions of approval. Newspapers all over California, and in other States as well, have praised the decision to remove the signs, and people who use the roads have freely expressed their gratification.

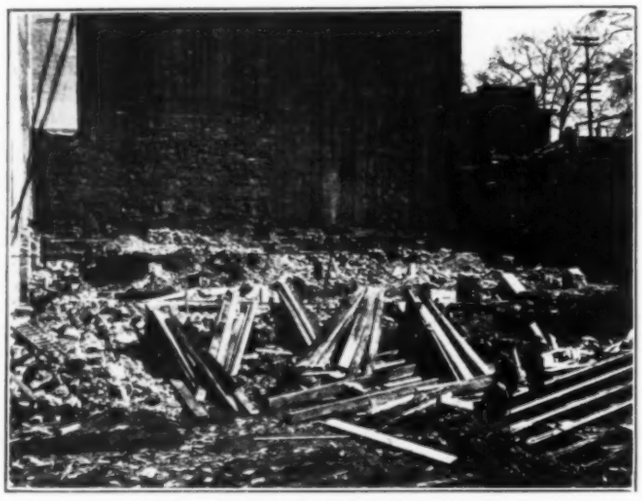
The work of removing these billboards has been done thoroughly. The company has sent out men who sawed or chopped them down and then destroyed them. In many cases the signs were burned. One friend of the company who evidently had heard nothing of the decision to remove the signs wrote a letter to the office of the company in San Francisco stating that the day before, when he was at work in his field, some man had come along and removed the big sign which had stood for several years near his barn. He thought that the company ought to know about this interference with its rights.

It is said that other companies which have been doing extensive billboard advertising along the highways of the country are planning to follow the example of the Standard Oil Company of California. If they do, it will mean that the highways of the United States will provide even more enjoyment to those who use them than they do at present.

MOVING A SEVEN-STORY BUILDING IN MONTREAL

Two Capstans Fitted with Concave Drums Pull 5000-Ton Department Store Two-Thirds of a Block

WHAT is believed to be the largest contract in building moving ever attempted in Canada was successfully handled when the seven-story concrete and brick building of the Morgan Department Store was moved two-thirds of a block in Montreal. The building was of reinforced concrete and brick. All outside walls were of 16-in. brick. The floors were of 11-in. solid concrete.



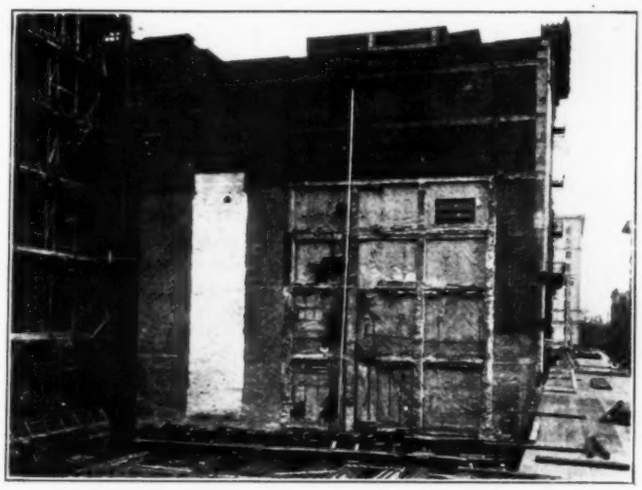
GETTING READY FOR THE MOVE

The work was done with steel rails, steel rollers and steel shoes on top of blocking. Two capstans fitted with concave drums, which are special for moving brick buildings, were used. The reason that the straight drums were not used is that the cable travels up and down on the drum, and the cable winds on the drum, increasing the diameter. This makes an uneven pull. With the concave drum, a couple of wraps are taken around the center of the drum, and the cable is reeled off on it on to a cable reel at the rear, fitted on axles. As this turns, the cable is wrapped on to the reel instead of on the capstan drum. This makes the pull always in the center and always even. It takes a

HOW THE BLOCKING WAS PLACED UNDERNEATH THE BUILDING. IN THE FOREGROUND IS THE RUNWAY USED IN GETTING THE BLOCKING DOWN IN THE PIT

good many thousand feet of cable for handling a big job, for the two capstans are put to the outside and threaded toward the center by means of tackle blocks at the building and at a fixed point a certain distance in front of the building.

Four horses supplied the power to pull this building, which was estimated to weigh between 4800 and 5000 tons. Each team of horses revolved a capstan attached to the end of the steel coil, which formed a belt line, passing through 33 pulleys. By this arrangement, up to 3500 hp. was produced. Only 2800 hp. was required to move the building, a good reserve thus being assured. The rollers used were of a special hard steel, 48 in. long, 2½ in. thick, 800 of them being required for this operation.



THE BUILDING READY TO BE MOVED

Despite the fact that the building was of such great size, the moving operation was completed without serious damage to the structure. The concrete floors and the brick walls both came through the ordeal in good shape. From start to finish the work was conducted without accident and results obtained fully justified the cost. The work of moving the building was conducted under the supervision of E. W. La Plante of Cedar Rapids, Iowa.

LAYING A PIPE LINE UNDER THE COLUMBIA

TWO birds were conveniently killed with one stone by the construction and operation of a submerged pipe line planned by engineers of the Port of Portland. It was necessary to deepen the channel of the Columbia River. It also was highly important to build an extensive dike, but the two operations were separated by a distance of about a mile and a half. The difficulty was removed through the use of a submerged pipe line. By means of it more than 1,000,000 cu. yd. of dredged material were advantageously disposed of.

LANDING PLATFORM AT LOW TIDE

For laying the pipe, a landing stage was built on the Oregon side of the river. The 30-in. pipe was then assembled on pontoons, one pontoon to each 32-ft. section of pipe. Wire cables were fastened to the center of each length of pipe, and two 40-ft. wire cables, one at each end of each length of pipe, were fastened to the pipe and to a long wire cable reaching across the river.

Beginning at one end of the string of pipe, a derrick barge lifted each length, its pontoon being then slipped out from beneath it. The pipe supported by the cable on the pontoon was left hanging in the water. After this had been done to each pontoon, the cables on the pontoons were slacked at the same time and the pipe lowered several feet into the water. Then a tug was made fast to one end of the string of pontoons and they were towed across the river, together with the submerged pipe. When the pontoons had been anchored and aligned, the pipe was lowered to the river bed. A derrick barge then raised one end of the string of pipe, and connection was made with the dredge and with other sections of pipe on pontoons and light trestles rising to the area to be filled.

For nine weeks this dredge averaged 800 ft. of completed dike per week, the dike cross-section being 30 ft. wide on top, 20 ft. high and 300 ft. wide on the bottom.

RELIEF VALVE ON PIPE LINE

The work was done under the supervision of the chief engineer of the Port of Portland, J. H. Polhemus.

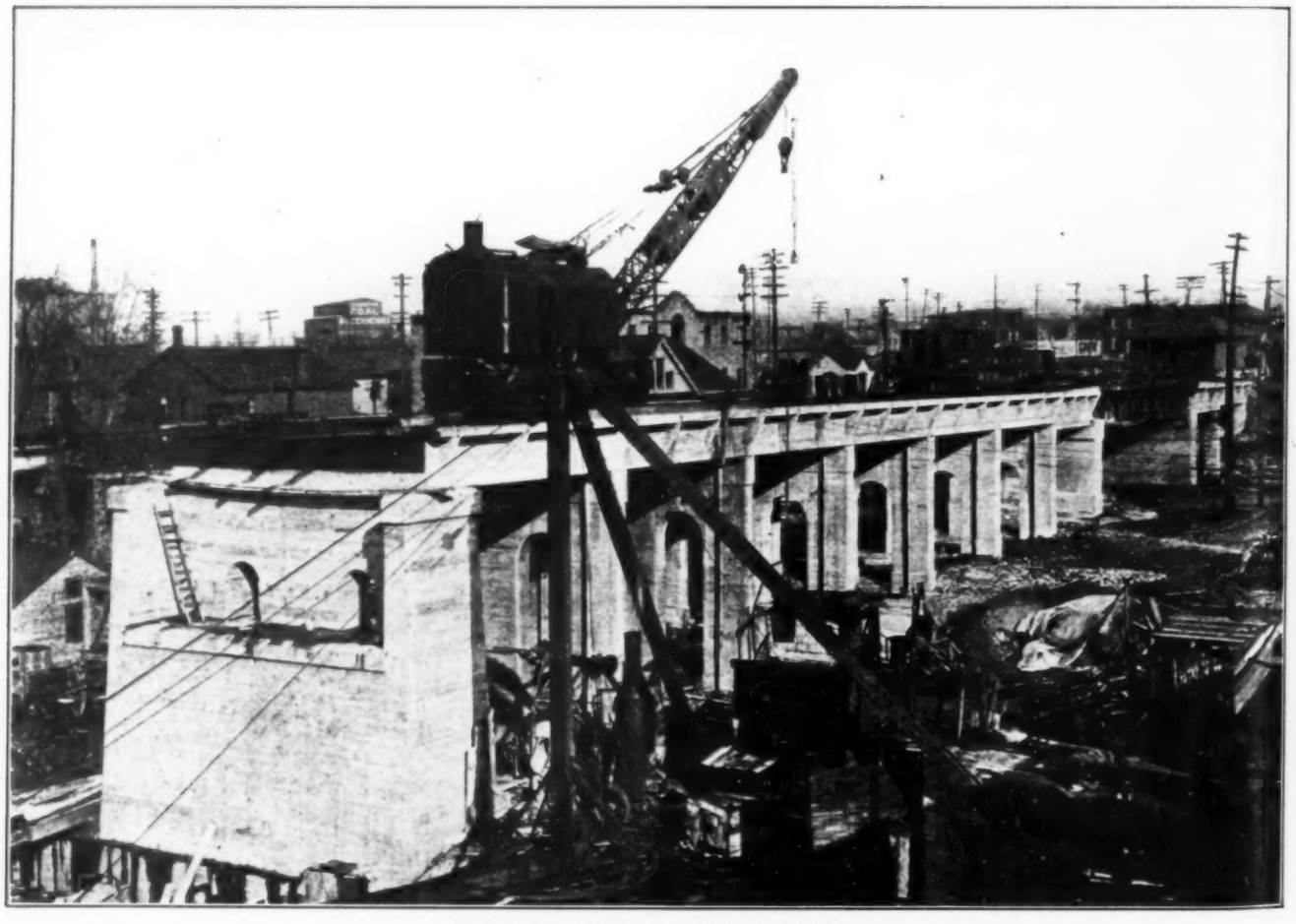
A NEW BRIDGE OVER NIAGARA GORGE

Michigan Central Railroad Solves Several Difficult Problems in Placing 640-Foot Span

THE great Niagara Gorge is being spanned by a new bridge. Work is now under way on the steel arch of 640-ft. span that will serve the Michigan Central Railroad. Its foundation is formed of four heavy concrete blocks constructed at the edge of the principal hard rock stratum at the sides of the gorge. The builders have met with unforeseen difficulties, especially in regard to the amount of rock to be removed. After the rock on top of the bluff has been cleared off in preparation for removing the overhanging rock at the rim of the gorge, it was found that the fissures and cracks extended much farther back than had been anticipated. Consequently, a great quantity of rock had to be removed. While this was being done it was impossible to go ahead with the work of excavating for abutments. Staging was built up to prevent the debris from being carried down the cliff. This extra removal of rock made it necessary to increase the length of the approach span on the American side. It also was necessary to drive the anchor tunnels considerably deeper than had been planned.

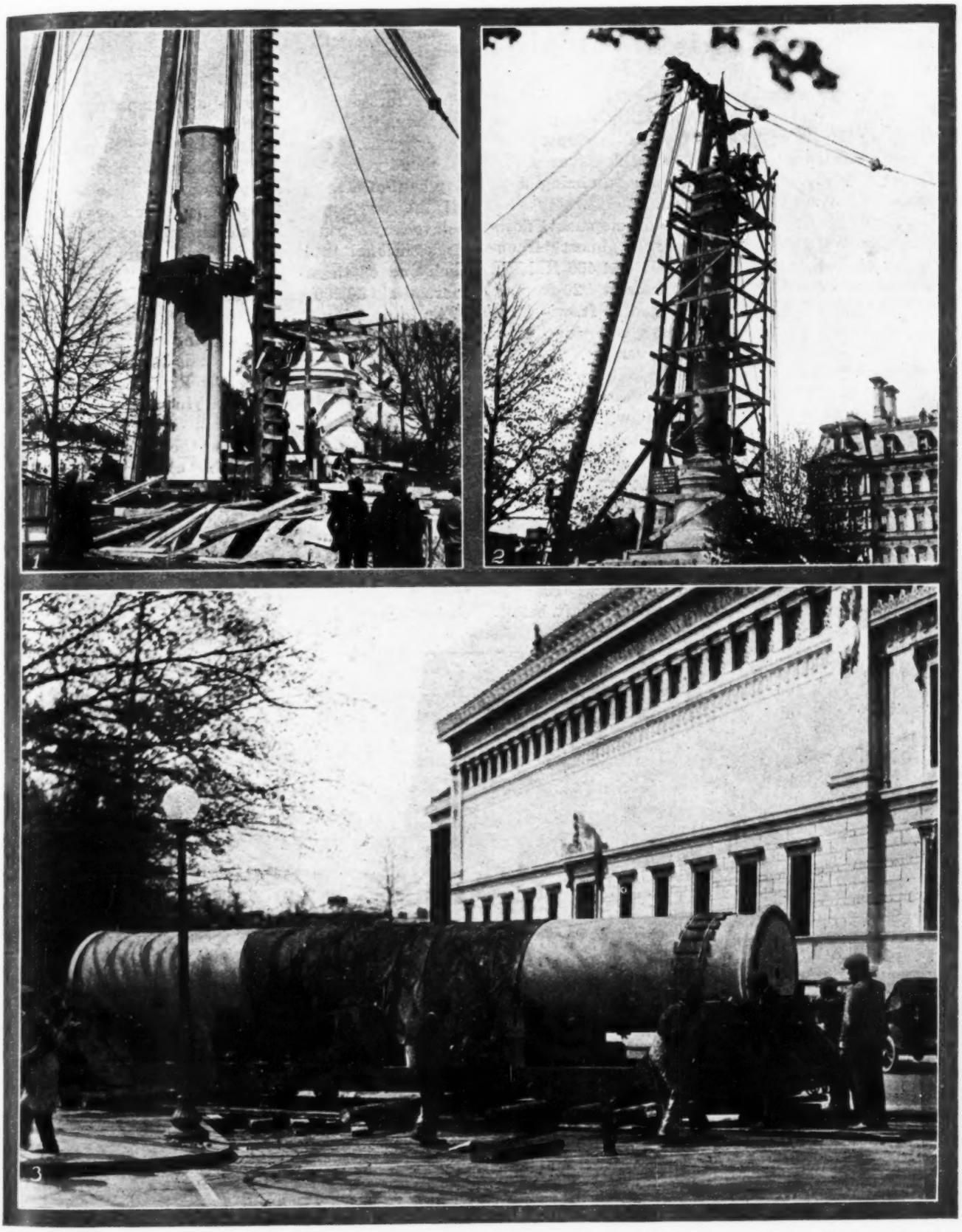
METHOD USED IN SETTING GRANITE COPING

Another difficulty that was not entirely foreseen was the trouble caused by great quantities of water encountered in the inclined anchor tunnels. Pumps had to be kept going all the time to handle the water that kept coming in at the rate of nearly 50 gal. a minute. Finally the water was successfully confined to a few pipes leading to a sump at the bottom and work in the tunnels proceeded without interference.



BUILDING THE APPROACH VIADUCT

Making a Monument



The First Division of the A. E. F. is to be honored with a monument in Washington, D. C., which will be unveiled by President Coolidge. The photographs on this page show how the contractors in charge handled the difficult work of setting up the monument which will bear the names of 5583 men of the division killed in France.

1. Getting ready to put the shaft in place. © *International.*

2. Placing the gilded statue of Victory on top of the monument 75 ft. above the street. © *P & A Photos.*

3. Hauling the granite shaft through the streets of Washington. It weighs 56 tons and is 35 ft. in height. © *International.*

INCREASING KENTUCKY'S HYDRO-ELECTRIC POWER

Construction of 270-ft. Rock-Filled Dam Will Add 24,000 Kilowatts to State's Facilities

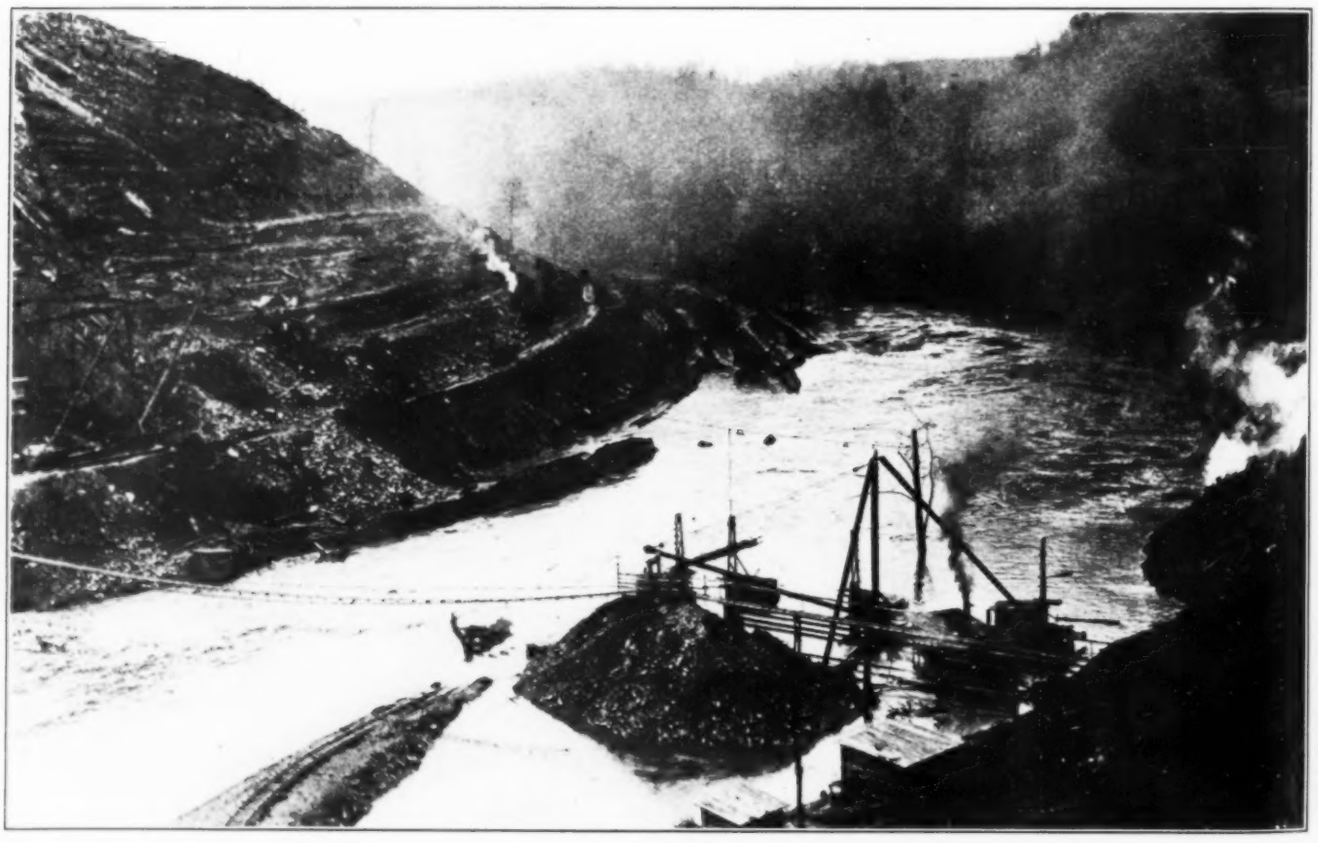
THE highest rock-filled dam in the world is being built by the Kentucky Hydro-Electric Company, a subsidiary of the Middle West Utility Company of Chicago, as a part of its plan for the development of the hydro-electric resources of the Dix River a few miles east of Burgin, Ky. The work is being done by the L. E. Myers Co. of Chicago.

Dix River, at the point of the development, flows at the bottom of a deep gorge between almost perpendicular cliffs which are between 300 and 400 ft. high. The dam will be 900 ft. long on the crest, 720 ft. wide at the base, and 270 ft. high. A road 20 ft. wide will cross the top, from which the sides will slope down 1.4 to 1 down-stream and 1.1 to 1 up-stream. The face of the dam on the up-stream side will be surfaced with concrete, the slab being 18 in. thick at the bottom and 8 in. at the top. The great fill will be made in three lifts, the first of which will take half of the 1,600,000 yd. of rock filling.

The rock for the fill is obtained by excavating the spillway of the dam a short distance back from the west wall of the gorge, almost within a stone's throw of the dam site.

The main problem in building the dam is the transportation of the rock to be used for the fill from the spillway quarry to the bottom of the dam, 340 ft. below. After considering cableways and other methods, the contractors decided to install air dump cars of 16-yd. capacity, the largest which can be handled on the heavy grade. The dumping point for the first lift is reached by a series of switch-backs, involving a round trip haul of three miles up or down a 2 per cent grade all the way, under conditions which would make delays very expensive. On completion of the big fill, if no additional transportation equipment is installed, each one of these air dump cars will have carried more than 50,000 yd. of stone.

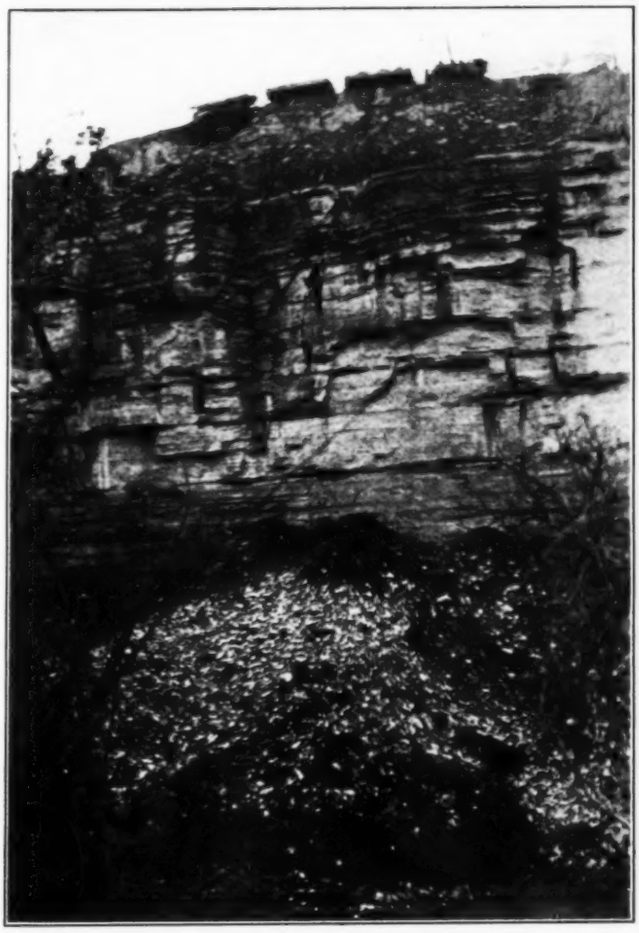
An interesting phase of the work is the building of a 24-ft. tunnel 900 ft. long through the east cliff around the end of the dam. This tunnel will be used to divert the course of the Dix River during the construction of the dam. Later, in connection with a 22-ft. shaft 150 ft. high, it will convey water to the turbines in the power house at the north portal under a working head of 240 ft. The contract for this tunnel was sublet to the John S. Lusk Company of Knoxville, Tenn., and to M. P. Smith, the job to be completed in 60 working days. Mr. Smith's method for getting the work done quickly is to drive a center bore 8 ft. by 12 ft. and then put a steam shovel on the job. The rock is removed in special constructed 1¼-yd. dump cars operated with a hoisting engine.



SITE OF DAM DURING HIGH WATER, WHEN THE STEAM SHOVELS WERE ALMOST ENGULFED

The work is being done by a force of 700 to 800 men, working in two 10-hr. shifts, under the direction of Supt. Albert Nelson. The men get down to the bottom of the canyon by means of a series of stairways made up of 376 steps. Lumber and other supplies are lowered into the canyon by a cableway and a cable bridge is suspended across the river at the foot of the stairway for use of the workmen. Every effort is made to provide comfort and amusement for the men, the camp at Dixdam being modern in every respect, with electric light and sewer systems, and having a moving picture theater and other entertainment places.

The dam will be completed by the end of this year. It will back up the water in the gorge for 33 miles. On completion of the project, 24,000 kilowatts, or 35,000 hp., will have been added to the power facilities of Kentucky. L. F. Harza of Chicago is consulting and designing engineer on the project. G. W. Howson is resident engineer, representing the owners. T. S. Johnson is engineer for the contractors.



DIRT DUMP USED IN STRIPPING THE SPILLWAY

The three photographs which accompany this article show various phases of the work. The picture on page 14 gives a good idea of the site of the dam. It was taken at a time when the water in the river was very high and work was being carried on under extremely difficult conditions. The two photographs on this page show details of the excavation and placing of the rock for the fill.

The lower photograph on this page shows a steam shovel loading the air dump cars at the spillway quarry. The upper photograph shows the disposal of the material stripped from the spillway. It was hauled in large dump cars to a point at the edge of a high cliff and then dumped overboard.

Projects such as these are developing the power resources of this central portion of the United States to such an extent that California, which now has the greatest electrical development per capita will have to look to its laurels.

SHOVEL LOADING THE 16-YD. AIR DUMP CARS WHICH TRANSPORT THE ROCK USED IN FILLING THE DAM

BUSINESS AS USUAL

New Building Constructed Without Interrupting Bank's Daily Routine

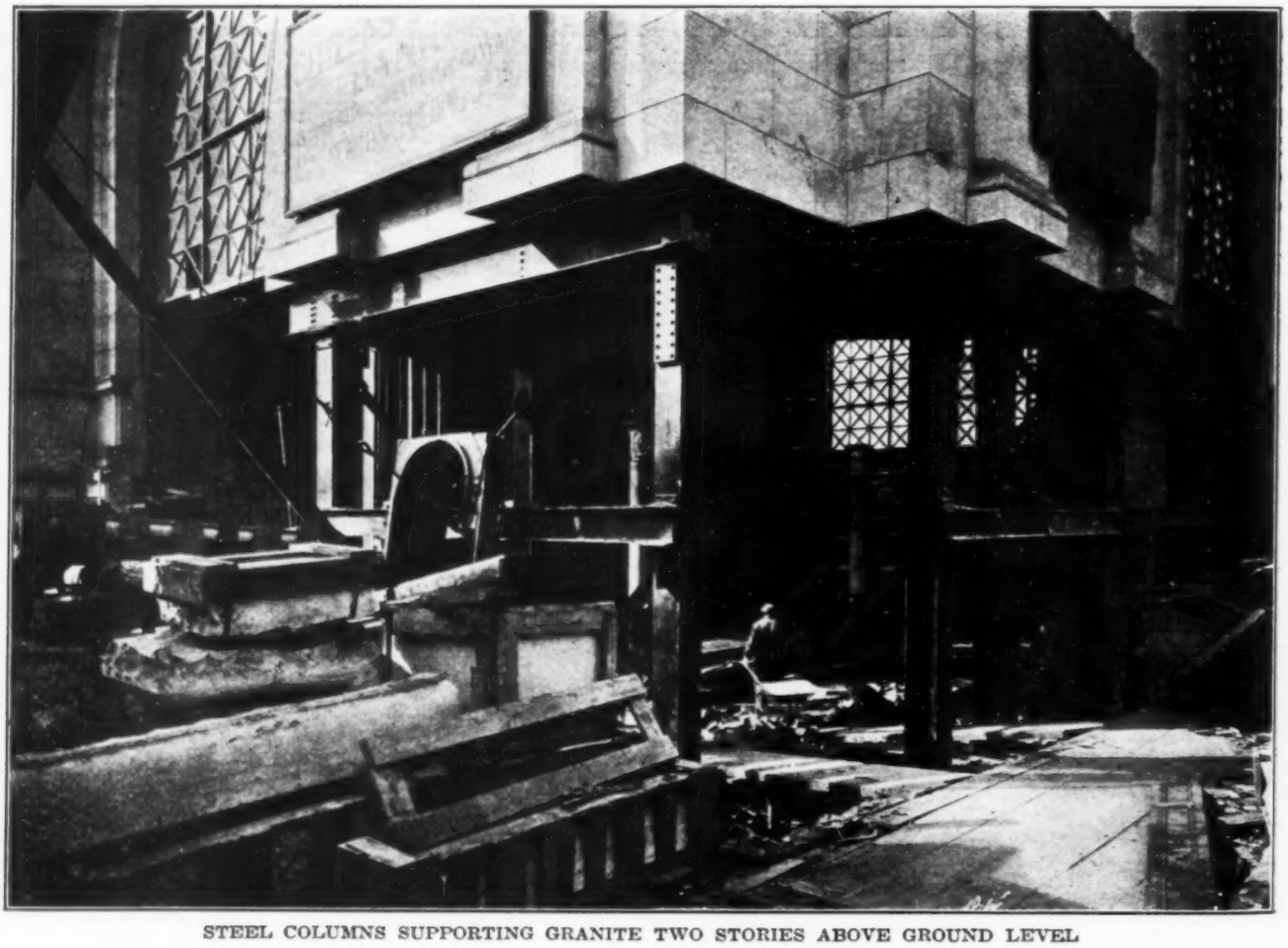
THE Citizens Savings Bank's record of more than 60 years of doing business on the same New York corner is still intact, and in addition the bank is pointing with pride to a new $750,000 granite building. It required a wealth of ingenuity on the part of the William L. Crow Construction Company, the contractors, of Clarence W. Brazer, the architect, and of Gunwald Aus, the engineer for the architect, to maintain the bank's record of three score years on the same site, but the job is being successfully accomplished and the new building will be complete in a few months.

The old building was a four-story structure, and the first move of the contractors was to take down the two upper floors of the brownstone building and roof over the lower floors, in which the bank's business kept on without interruption. The next step was the establishment of the footings for the new building. This was not an easy job, because of the fact that one of the New York subways runs through Canal Street on the north side of the bank and it was necessary to carry the footings lower than the subway. This in turn made it necessary to underpin the subway, a work which took considerable time and had to be done with extreme care.

When the footings had been completed the steel columns were erected and carried up through the portion of the old building which was still standing and the construction of the upper part of the new building was begun. The large photograph at the bottom of this page shows the steel columns supporting the stone work of the upper part of the new building. What appears to be the ground level in this photograph is really the roof of the two stories of the old building which were left standing and in which the bank's work was going on continuously.

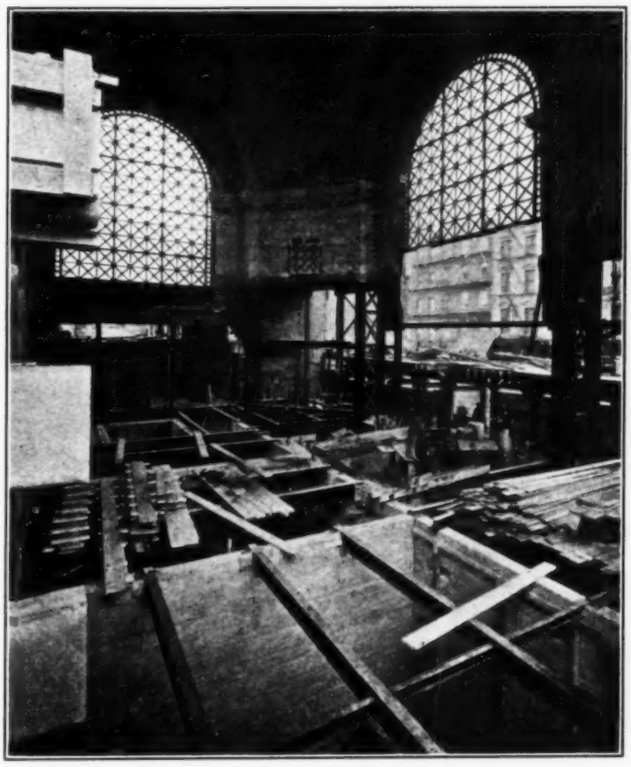
As some of the photographs show, the building is surmounted by a large dome, and its construction required some rather delicate handling of the steel. The dome itself is built of terra cotta and, of course, had to be made watertight. This proved to be one of the most difficult phases of the entire job.

When the upper part of the building had been finished, including the setting up of the granite walls



STEEL COLUMNS SUPPORTING GRANITE TWO STORIES ABOVE GROUND LEVEL

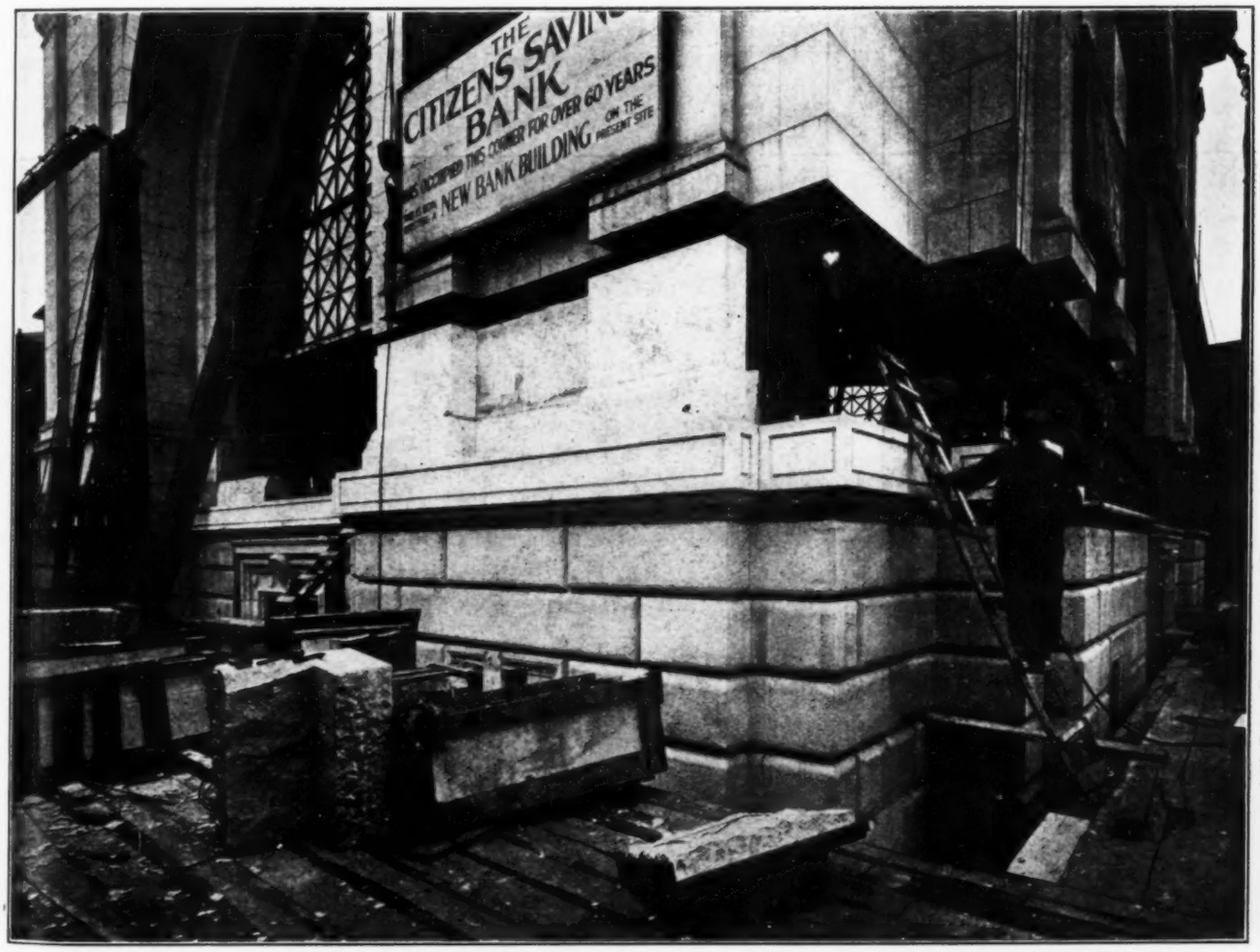
and the completion of the dome, the walls were carried down to the ground level in the southeast corner of the building. A space about 25 ft. square, with an entrance on the Bowery, was then inclosed with temporary walls, and arrangements were made for the bank to occupy this space while the remaining part of the old building was being demolished and the rest of the new building completed. The work was so timed that the bank was enabled to move to its new quarters over the week-end. It closed as usual on Saturday noon in the old structure and opened at 9 o'clock Monday morning in the space provided for it in the corner of the new building.



INTERIOR OF UPPER PART OF NEW BUILDING

Then the work of tearing down the lower two floors of the old building was begun. It took only a short time and left the way clear to put in the foundations for the walls of the new building and bring the walls up to the point where the granite work stopped. The large photograph at the bottom of this page shows the meeting of the stone work. The part finished first may be seen at the top of the picture and the walls at the bottom are rising to meet the finished work above.

It probably will be autumn by the time the new building is entirely finished inside and out, but in the meantime the bank will gradually take over its enlarged quarters as fast as the va-



BRINGING UP THE GRANITE WALLS FROM THE GROUND TO MEET THE PORTION PREVIOUSLY BUILT

rious portions of the building are turned over to it by the contractors.

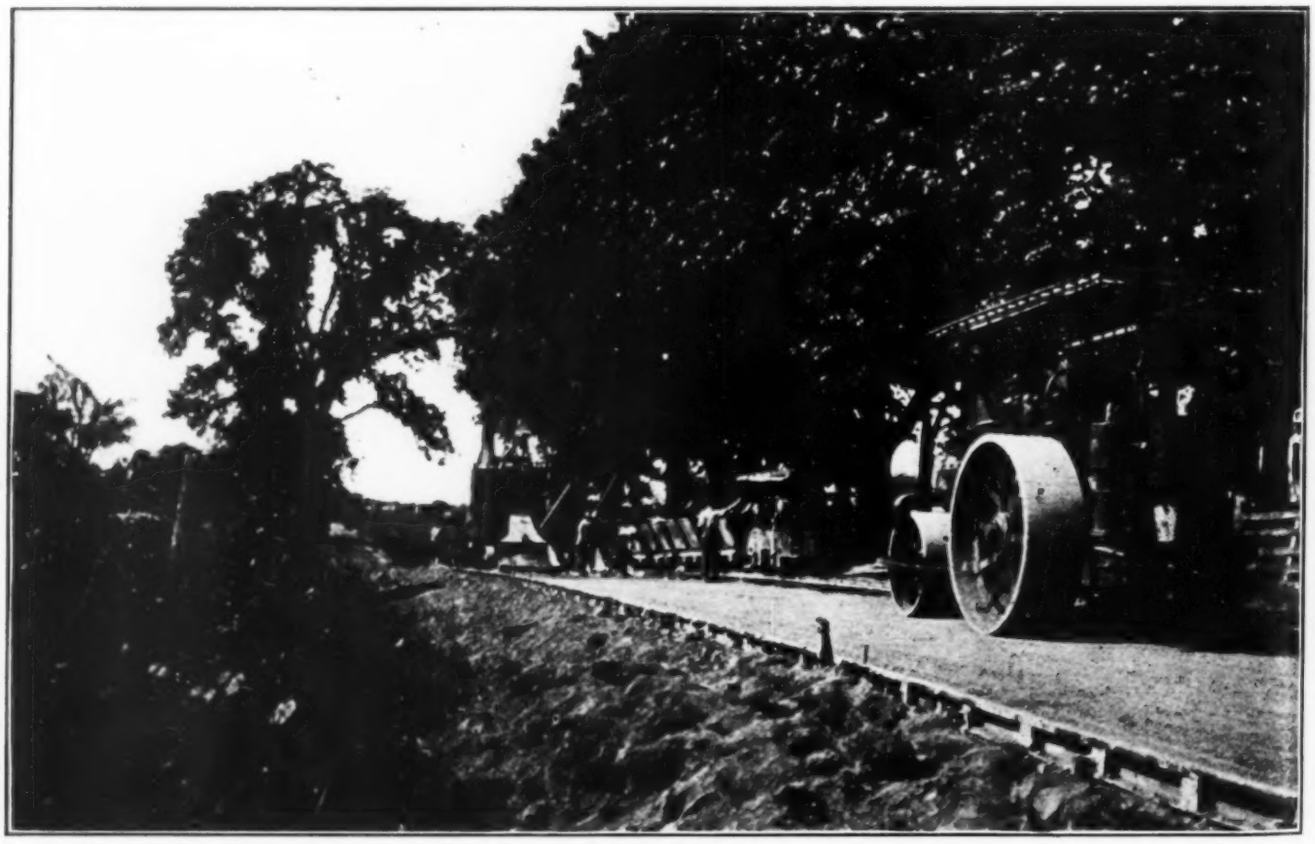
It approximates an eight-story building in size, although it consists of only one large bank room, with a few extra rooms just below the dome making an additional office floor. The dimensions of the building are 80 by 75 ft. and the height to the top of the dome is 110 ft. from street level. The walls are of granite.

This granite was obtained from the quarries of Marr & Gordon at Barre, Vt., a town which from the earliest days of the country has been noted for the quality of its granite. For much of the interior work Famosa marble was imported from Germany. This is a rose marble with streaks of gold running through it, and Mr. Brazer, the architect, used it as a part of a rose and gold color scheme. This interior work is going on at the present time and the bank is still occupying the limited quarters in the southeast corner.

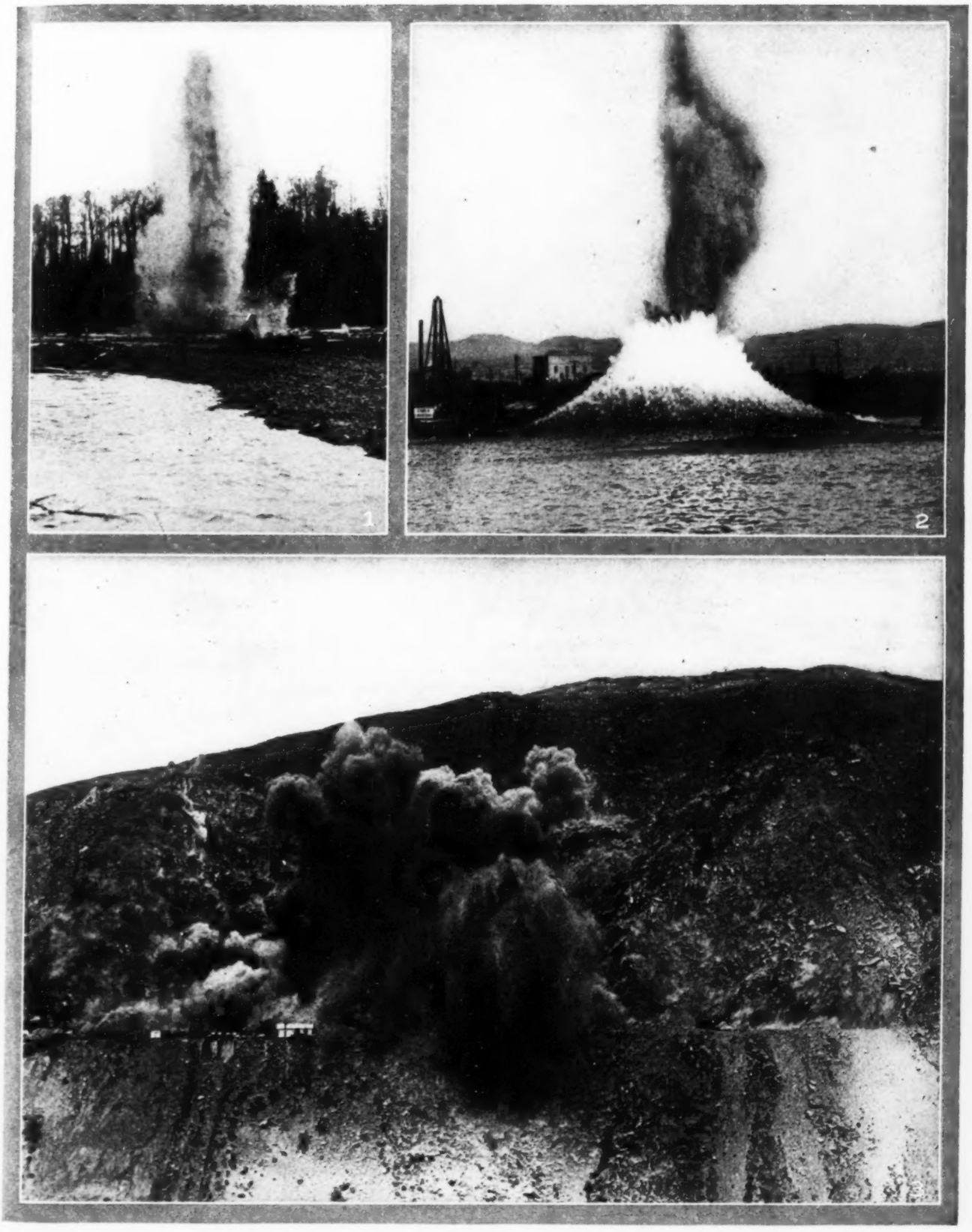
THE EXTERIOR OF THE NEW BUILDING SHOWING LOWER PART OF OLD STRUCTURE

The William L. Crow Construction Company is on the way to acquire a habit of building new bank buildings without disturbing the work of the bank. This is the second job of this nature which the company has completed in recent years. About a year ago it built the new home of the Roosevelt Savings Bank at Broadway and Gates Avenue in Brooklyn, and followed much the same procedure as that just described.

A NEW YORK ROAD JOB



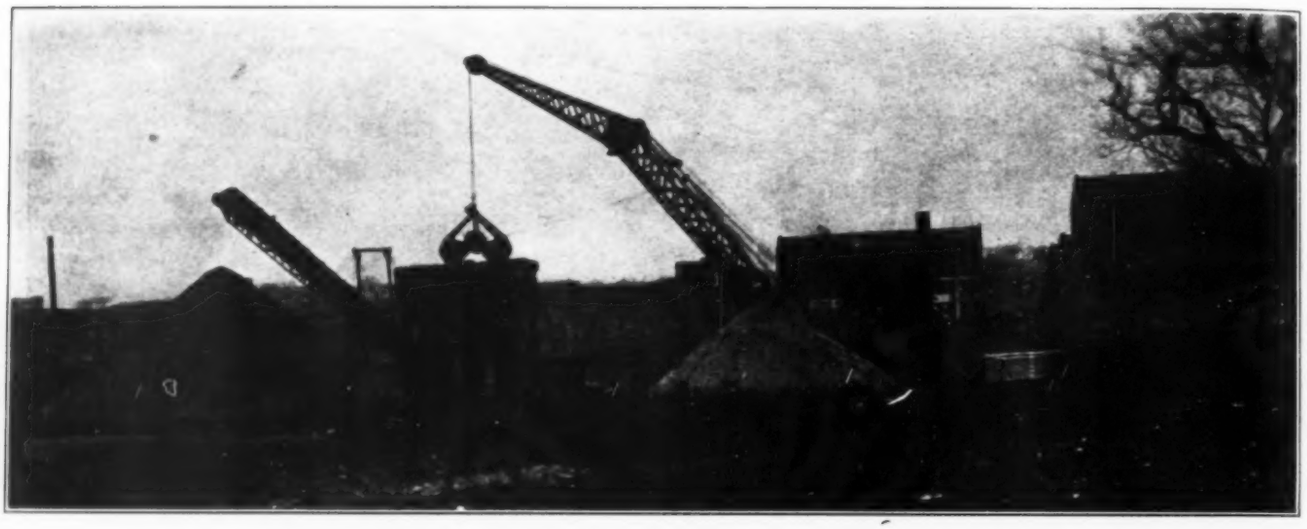
Going Up



1. Blowing up a log jam in the lumber country. © *International.*
2. Destroying the remains of a bridge which had outlived its usefulness at Oakland, Cal. © *P & A Photos.*
3. A blast at the Blue Diamond quarry, Corona, Cal. The whole mountainside was blown up with the aid of 185 tons of dynamite. © *International.*

CONVEYOR HELPS DEVELOP NEW BUSINESS

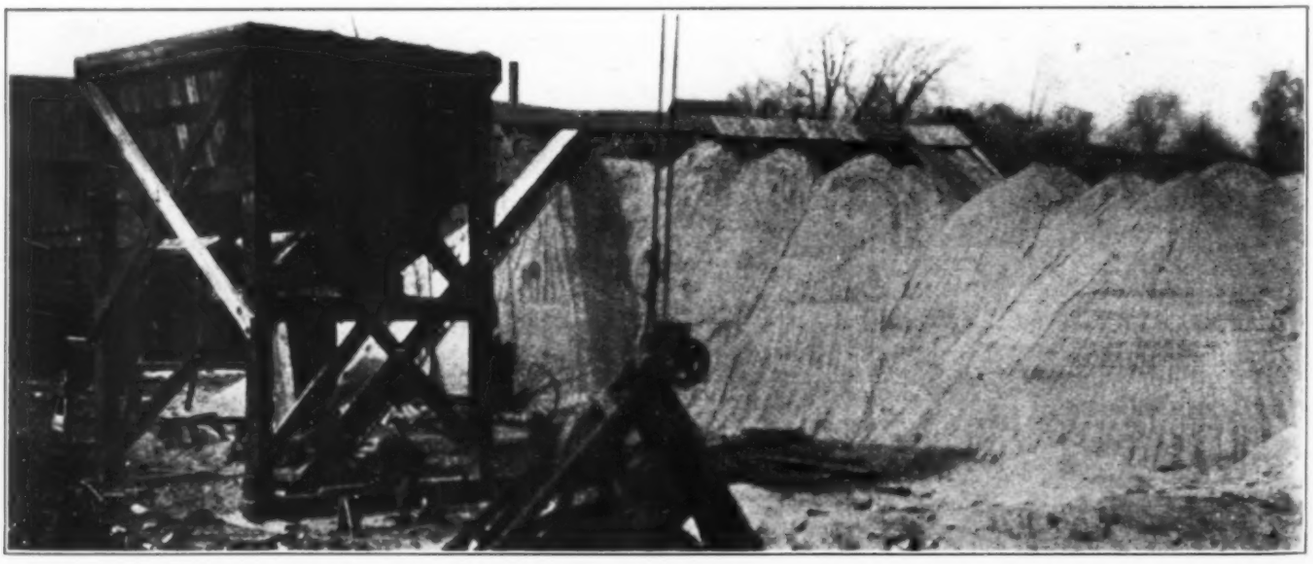
New York Sand and Gravel Dealer Gains Customers by Increasing Storage Capacity



THE photographs accompanying this article show a conveyor which has helped its owner, Ulster Davis of Rensselaer, N. Y., to develop an entirely new business for himself. Mr. Davis is in the sand and gravel business, and due to the increased facilities for storage which the use of the conveyor has provided him, he has been able to get as customers a number of the brickyards along the Hudson to which he supplies sand.

His man power in handling the sand is very economical, due to the up-to-date machinery which he uses. As may be seen in the photograph above, a clamshell bucket handles the sand from the barge to the bin. The conveyor is then placed underneath the hopper of the bin and proceeds to store the sand in a semi-circular pile. The work of storing the sand is carried on all through the fall and winter, and when the spring and summer come on the storage piles are ready to fill in between waits for the barges. When the sand is available from the barges, much of it is loaded directly into the bin and then into the trucks. When the delivery by barges slows up, the conveyor is turned around and the bin is filled from the storage piles, thus avoiding any delay and enabling Mr. Davis to fill his orders from the brickyards.

This work takes but four men for handling the material from the barge, for running the hoist, and for tending to the conveyor. With this gang and the mechanical equipment, Mr. Davis handled between 300 and 400 yd. in one day. For 100 working days in 1923 the machine handled 10,000 to 12,000 cu. yd. of sand. The repairs during that time amounted to $5.



THE UPPER PHOTOGRAPH SHOWS THE CLAMSHELL HANDLING MATERIAL FROM THE BARGE. BELOW, THE CONVEYOR MAKING A STORAGE PILE

NORTH DAKOTA'S STATE GRAIN ELEVATOR

Big Structure Is Equipped with Modern Machinery—Up-to-date Power Plant in Separate Building

NORTH DAKOTA'S State-owned grain elevator and mill at Grand Forks which has been the cause of considerable discussion all over the country, is just about ready to go to work at full capacity. The mill has now been in operation for three or four months and the elevator is almost finished.

Work on the big job begun in March, 1920, and construction has been going on ever since, although from time to time there have been delays due to the shortage of building material. The general contractor was the Fegles Construction Company, which did the work under the engineering supervision of the Charles L. Pillsbury Company. The Strong Scott Manufacturing Company handled the manufacture and installation of the mill equipment. All three of these firms are Minneapolis organizations. H. G. Lincoln of the Charles L. Pillsbury Company was in charge throughout.

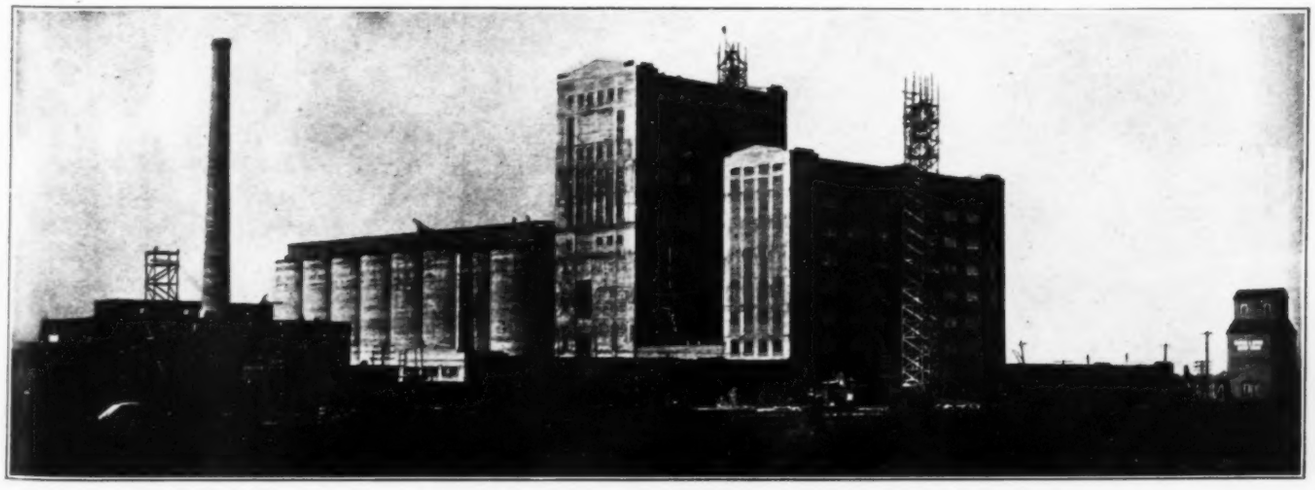
POWER HOUSE WITH DERRICK FOR HANDLING COAL

The mill consists of three units, two of 1000 bbl. each for spring wheat flour and one of 1000 bbl. capacity for durum wheat. The first unit was put in operation last November and has proved unusually efficient, producing more than 1150 bbl. per day.

As may be seen in the photograph at the bottom of this page, which was taken while construction work was still going on, the mill is eight stories high and the frame is built of reinforced concrete. The higher building in the center of the photograph is the work house of the elevator. Its dimensions are 60 by 128 ft. and it is 194 ft. high.

Storage space is provided in the tanks for 140 bins with a capacity of 2500 bushels each. At the left of the photgraph may be seen the power plant, which also appears in the center of the upper picture. This power plant has been described as an "institution in itself." It contains 400 hp. boilers with automatic stokers, the coal being fed to the stokers from the storage yard outside by the derrick shown in the photograph. Two steam turbines of 1500 hp. capacity provide the power for the plant. Two boilers and one turbine are sufficient to operate the mill and elevator and the others are kept in reserve. The power for the entire establishment is controlled from a central switchboard in the dynamo room.

The mill and elevator are equipped with modern grain-handling machinery and the operation of so large an establishment by the State will be watched with great interest. The total cost of the building was in the neighborhood of $2,500,000, which is a considerable investment for so small a state.



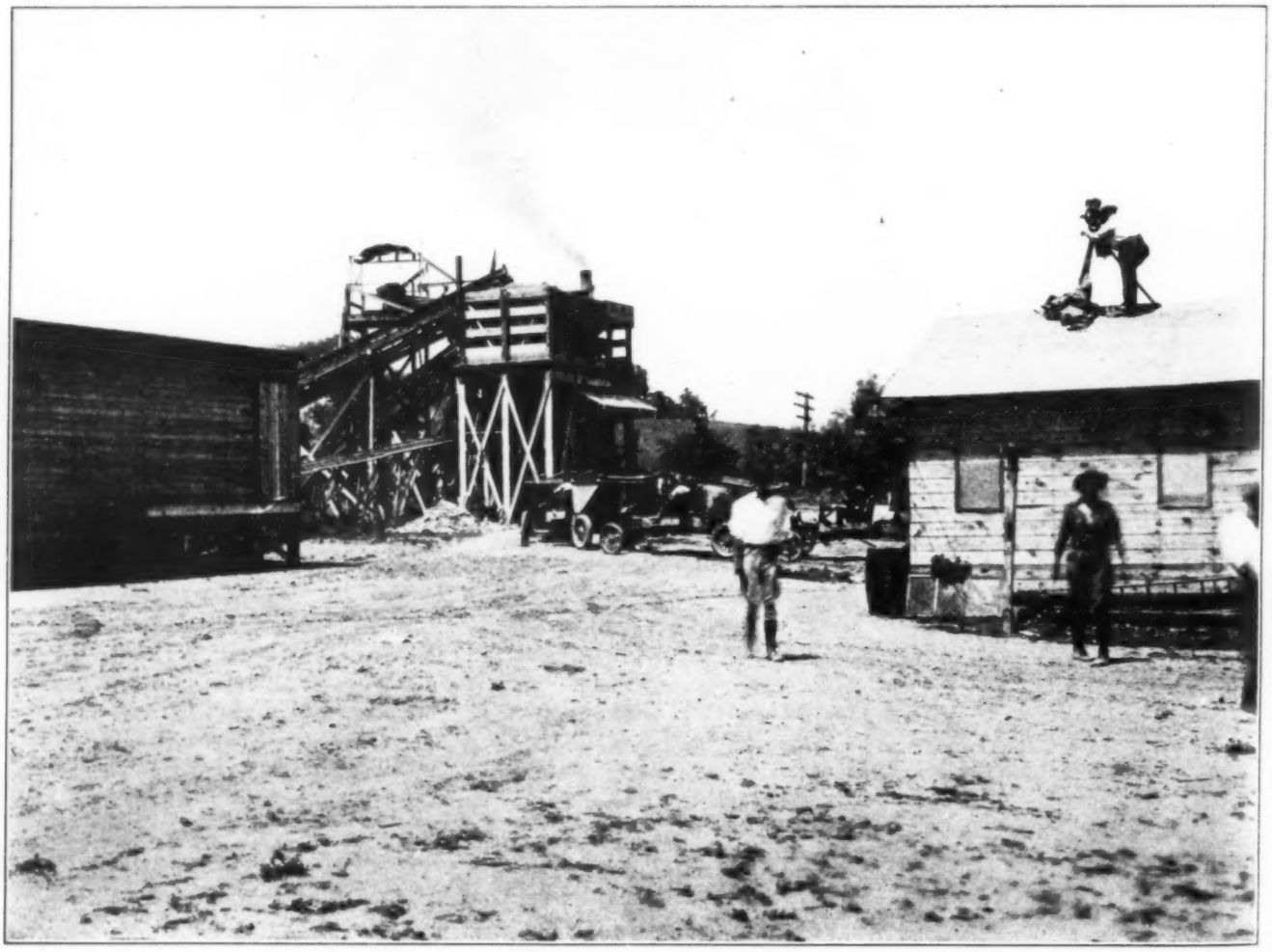
GENERAL VIEW OF MILL AND ELEVATOR

AUTOMOBILE WORKS AS EXCAVATOR

IN making excavations in the beach sand for the 16-in. pipe that is used in filling the new swimming pool built by the Park Commission in San Francisco, an automobile with a winch was used in making the excavation for the pipe and in backfilling. The owner of the automobile, in changing the automobile so as to operate the winch, removed the ordinary axle and installed an extension axle. On the outer end of the extension axle he placed a sprocket. A chain operated by this sprocket was used to drive a sprocket on the drum, which was installed on the back of the automobile. There was a special lever connected to the ordinary engine clutch to give power from the automobile engine. The double drum operated cables connected to a scoop which was pulled back and forth by the engine. The sand was removed for a distance of about 25 ft. and then two 12-ft. sections of pipe were placed in the trench. In making excavations for the next two sections the sand taken from the trench is deposited on the two sections just laid, thus performing two operations (excavating and backfilling) at once.

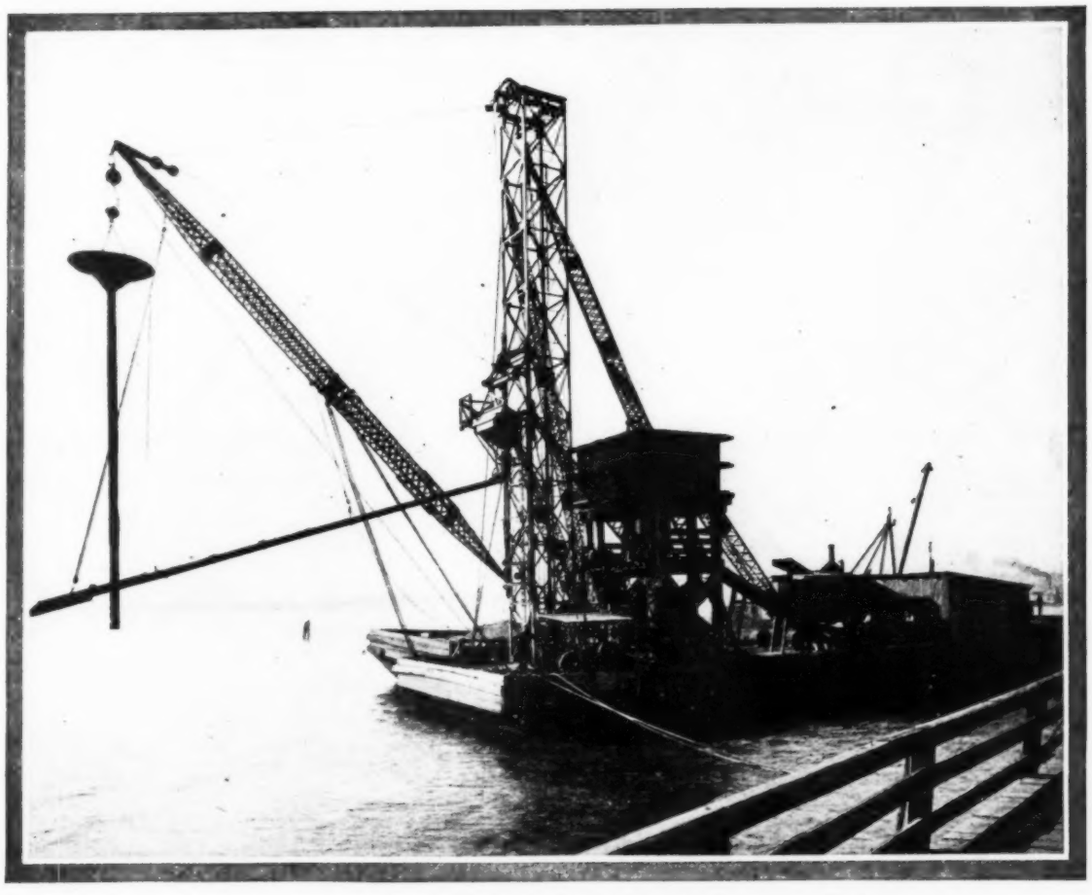
MATERIAL YARD BREAKS INTO MOVIES

THE value of showing to the people what you can do often is not realized by the average contractor. The photograph at the bottom of this page was taken on a job run by a contractor who was alive to the benefits of showing others what sort of work he was doing. On the right of the photograph may be seen a camera man who is taking moving pictures of this contractor's material yard. These pictures will give the contractor a record of the operation of his material handling plant which he can use long after it has been dismantled.



LAKEWOOD

Paving and Construction Equipment



A Floating Concrete Plant furnished the Sanford Brooks Company of Baltimore for work at Charleston, S. C.

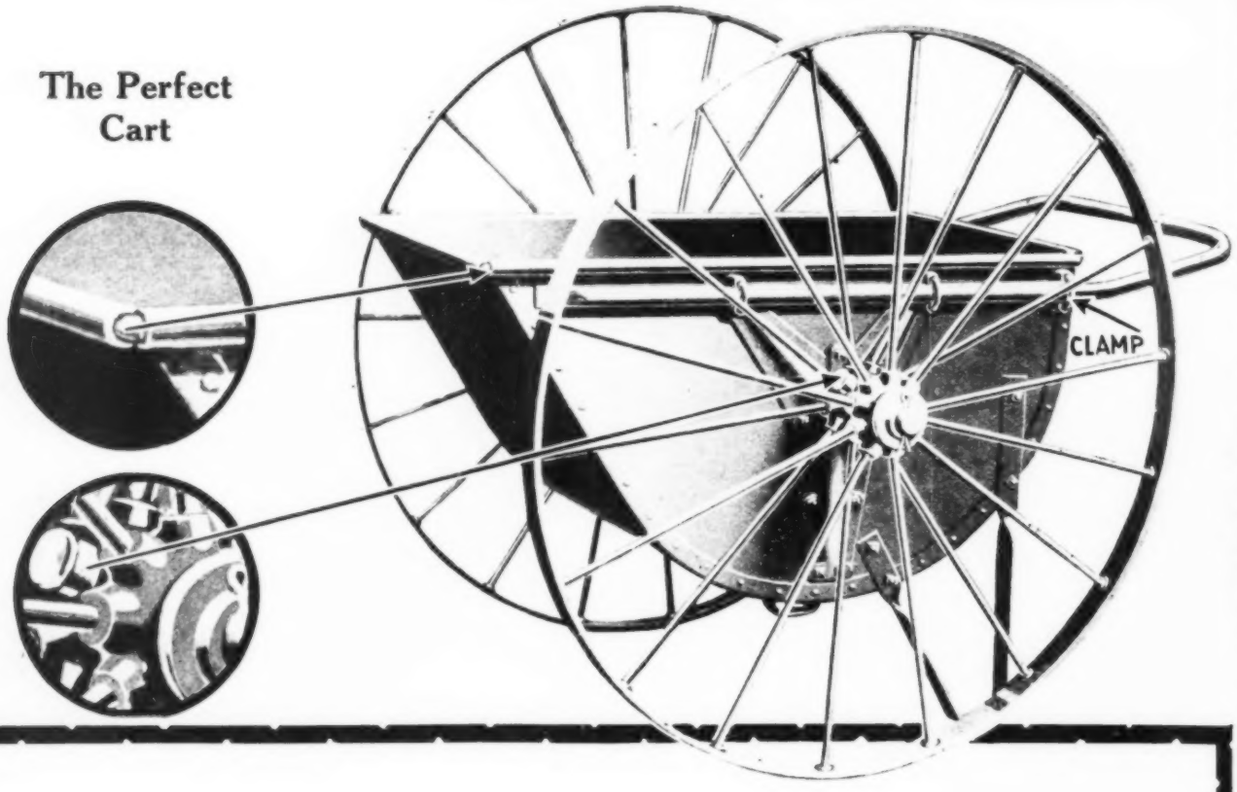
The greater capacity, greater strength and longer life of Lakewood Chuting Equipment makes it particularly valuable for special plants such as the one shown above.

Write for Bulletin 23-S. It gives complete information on Lakewood Chuting Equipment

THE LAKEWOOD ENGINEERING CO. CLEVELAND

STERLING No. 6

The Perfect Cart



When you consider the average load of concrete wheeled in a concrete cart is 6 cu. ft. or approximately 900 pounds; that this load is roughly handled over irregular runways, and often over projections or down a step or two, you know what a cart is up against.

Certainly you want an article made strong enough to stand the gaff—this is it!

Tray is 12 gauge throughout. Note its double reinforcement at top edge, its heavy malleable brackets, its clamped handle, its 42-in. wheels with grease cups.

The Sterling Catalogue describes more fully this strong cart.

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BOSTON
CLEVELAND
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CANADIAN AGENTS-MUSSENS LIMITED, MONTREAL TORONTO, WINNIPEG, VANCOUVER

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